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ABSTRACT

The performance of 75 congenitally blind and 75 sighted subjects (6- to 18-years-old) was compared on 32 Piagetian measures of reasoning, moral judgment, and moral conduct. Among major findings were that blind Ss did not achieve the reasoning processes characteristic of concrete operational thought with the facility or completion that would be expected for persons of their age and IQ (an average delay of 8 years was noted) and that few significant differences occurred between the blind and sighted groups on measures of moral judgment and moral conduct. Deficiencies found in the reasoning of blind Ss indicated a need to provide these persons with opportunities to interact and reason in ongoing situations. (Author/LS)

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FINAL REPORT

PROJECT NO. H23-3197
GRANT NO. OEG-0-72-5464

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THE REASONING, MORAL JUDGMENT, AND MORAL CONDUCT OF THE CONGENITALLY BLIND

November, 1974

The research reported herein was performed pursuant to a grant with the Office of Education, U.S. Department of Health, Education, and Welfare. Contractors undertaking such projects under Government sponsorship are encouraged to express freely their professional judgment in the conduct of the project. Points of view or opinions stated do not, therefore, necessarily represent official Office of Education position or policy.

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ABSTRACT

Major objectives of the study were: (1) to determine if the development of Piagetian reasoning, moral judgment, and moral conduct in congenitally blind persons differed from that of sighted persons, and (2) to establish the relationships which exist among measures of reasoning, moral judgment, and moral conduct. The random sample (N=150) was comprised of 75 congenitally blind (IQ 90-110) and 75 sighted (IQ 90-110) subjects; the two groups, blind and sighted, were subdivided into three age groups, 6-10, 10-14, 14-18. IQ was determined by WISC or WAIS Verbal Scales.

When comparison was made of scores for blind and sighted subjects on measures of reasoning, moral judgment, and moral conduct principle findings were:

1. Blind subjects did not achieve the reasoning processes characteristic of concrete operational thought with the facility or completion that would be expected for persons of their age and IQ. An average delay of eight years was noted in the development of reasoning in the blind.

2. Few significant differences occurred between the blind and sighted groups on measures of moral judgment and moral conduct.

Deficiencies found in the reasoning of blind subjects serve to indicate a need to provide these persons with opportunities to interact and reason in ongoing situations.

PREFACE

Work by Yvette Hatwell has served to indicate that blind persons experience major delays in the development of reasoning. Her findings represent the first major effort to employ Piaget's theory of cognitive development in an analysis of the thought processes of blind persons. After a review of her findings there was realization that an in-depth, cross-sectional appraisal of the cognitive processes of blind persons could provide information which would be useful in programs designed to equip these persons to function effectively in the world of today. To accomplish this appraisal was the goal of the present study.

At various stages of our project numerous people provided the assistance necessary for it to continue from initiation to completion. John Crandell's encouragement furnished the impetus for its launching, and Natalie Barraga's insightful interest generated sustained motivation. The support provided by Joseph Kohn, New Jersey Commission for the Blind and Visually Impaired, Elinor H. Long, Supervisor, Programs for the Visually Handicapped, Pennsylvania Department of Education, Frank S. Penland, Virginia Commission for the Visually Handicapped, and by members of their staffs was most beneficial. Although she did not survive to witness its completion, Althea Nichols' interest in the study will be remembered.

Gratitude is expressed to each of the schools who permitted their facilities to be used in the study. These were the Maryland School for the Blind, the Governor Morehead School of North Carolina, the New York Institute for the Education of the Blind, Overbrook School for the Blind, Western Pennsylvania School for the Blind, Virginia School for the Blind at Staunton, Virginia School for the Blind at Hampton, West Virginia School for the Deaf and Blind, and Public Schools in New Jersey, Pennsylvania, and Virginia.

Without the willingness of the subjects to participate, and of their parents to have them participate, the study could not have occurred. Their cooperation was basic to this project and to the subsequent one which is evolving from it.

The continued efforts of Stella Vail, Gary Moore, Marsha Wexler, Louis Beutler and other members of the staff made the report possible. Gratitude also is expressed to our government for the support provided by a grant from the Bureau of Education for the Handicapped.

B. S.
K. S.

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CHAPTER I - INTRODUCTION

Background Information

The purpose of the presently reported research project is to probe the specific effects that blindness - as sensory deprivation - has upon the development of reasoning, moral judgment, and moral conduct in persons ages six to 18. It is anticipated that the obtained data may serve as a research base for developing educational programs designed to promote development in the above three areas in the visually impaired.

Loss of vision, according to Lowenfeld (1973), results in three basic limitations: (a) range and variety of experience, (b) mobility, and (c) interaction with the environment. Moreover, visual impairment places the child at a disadvantage in the area of sensory stimulation, concept formation, and communication. Additionally, the blind child frequently is experientially deprived, has missed normal interaction with siblings and friends, and has not been encouraged to perform "helping" tasks which develop basic concepts (Moore, 1973).

Piaget (1960) has hypothesized that cognitive development proceeds as an individual interacts with his environment. Yet from the onset, a congenitally blind person does not experience the interaction which is typical of growth in the normal child. Because of this, one would assume that development of blind children would proceed at a slower tempo and/or deficits would occur in their operational processes. Fraisse (1966) has stated that eyesight is the sense that enables man to perceive simultaneity and that successiveness only gives a figurative approximation of it. Therefore, ". . . among blind children this deficiency slows down the development of the operations leading to the conceptualization of the permanence of the object and the establishment of a network of reciprocal relations between objects" (Fraisse, 1966, p. 111).

The theory of cognitive development expounded by Piaget and Inhelder was chosen as a basis for the present study because of its major contributions to the study of development of reasoning and moral judgment in children and because of the ingenious methods utilized to assess these processes (Piaget, 1964; Piaget & Inhelder, 1941). Hatwell (1966) has successfully used the Piagetian model of cognitive development in assessing the reasoning ability of blind children. She found that although the blind followed the same sequence of cognitive development as the sighted subjects, their rate of development was slower and they functioned as much as four years below their sighted peers in reasoning ability. Further, the congenitally blind showed serious retardation when their performance on reasoning assessments was compared with that of sighted subjects, regardless of whether the sighted employed visual perception or tactual perception.

More recently, a Piagetian framework was utilized in the longitudinal study, The Development of Reasoning, Moral Judgment, and Moral Conduct in Retardates and Normals (Stephens, Miller, and McLaughlin, 1969; Stephens, 1972). These findings indicated that significant differences occurred in these three areas when the development of retardates was compared with that of normals. Factor analysis of Piagetian reasoning, Wechsler Intelligence Scale, and Wide Range Achievement Test scores from the Stephens, et.al., study (1969) indicated Piagetian operational thought represented areas separate and distinct from those measured by standard tests of intelligence and achievement. The Piagetian measures suggested three facets of functional thought: (a) "reversibility," i.e., realization that a given quantity remains invariant despite changes in shape, mass, etc., (b) classificatory and categorization skill, and (c) spatial orientation and mental imagery. The present study attempts to extend this type of Piagetian based analysis to a comparison of normal congenitally blind and normal sighted children.

Measures used in the currently reported study to assess reasoning and moral judgment were derived from Piaget's theory of cognitive and moral development (Piaget, 1960, 1962). Techniques employed to assess moral conduct, observance of behavior in situations designed to measure honesty, truthfulness, reliability, and persistence were derived from earlier work by Hartshorne and May (1928, 1929) and Murray (1947). Each of these assessments were used previously in Stephens', et al. study (1969) of the development of reasoning, moral judgment, and moral conduct in normal and retarded children. In addition, the data collected on normal sighted subjects from this earlier study (Stephens, et al., 1969) were utilized in the present study as the base line data for normal sighted subjects against which data collected on the normal blind subjects were compared. Adaptations were necessary for some measures prior to their use with blind subjects. An initial pilot study conducted at Overbrook School for the Blind and Temple University contributed to the development and validation of these adaptations (Simpkins & Stephens, 1970).

Inclusion of two areas, moral judgment and moral conduct, was deemed appropriate because studies which compared moral development in the congenitally blind with moral development in the sighted were nonexistent. Since moral judgment does not make major demands on perceptual cues, it was hypothesized that the visually handicapped child might experience no developmental difficulty in this area. Also, since interaction with environment (persons and things) frequently is curtailed, it was thought that the visually handicapped child might bypass the acts of observed misconduct exhibited by young (ages 6 to 10) normal and retarded children (Stephens, et al., 1969), and thereby achieve advanced levels of moral development at younger ages than normal or retarded persons.

Statement of the Problem

Because adult success depends on performance in reasoning, moral judgment, and moral conduct, the purpose of the project was to assess the performance of 75 congenitally blind subjects in these three areas and compare the results with those previously obtained for 75 sighted subjects by Stephens, et al., (1969). Specifically, the present study sought to:

1. Establish the relationship among levels of reasoning, moral judgment, and moral conduct for congentially blind persons.

2. Determine whether the development of reasoning, moral judgment, and moral conduct in congenitally blind persons differs from the development in sighted persons for these three areas.

Data from the study serve to validate measures which may be used to locate blind persons on developmental scales of reasoning and moral judgment. Knowledge of the specific level of development should bring desired precision to the evaluation of visually impaired children and should have implications for curriculum planning in training programs. Following this, further research is recommended to devise, effect, and evaluate individual intervention programs in areas in which the congenitally blind subjects are found to be deficient.

Review of Relevant Literature

Because the three areas, reasoning, moral judgment, and moral conduct, do not necessarily contain common abilities, research in the past generally has dealt with only one of the three areas to the exclusion of the other two. In light of this, review of previous work will be presented separately under the three headings.

Reasoning

Assessment of cognitive development in the visually handicapped traditionally has relied primarily on verbal procedures. Bauman (1973) stated that the single test most frequently used with blind clients of all ages by psychologists in the United States is some form of the Wechsler Scales. Yet research by Cutsforth (1932), Nolan (1960), and Harley (1963) indicated that, although the blind did manipulate verbal symbols with considerable fluency, their degree of understanding in terms of object reality was significantly impaired. While the Haptic Intelligence Scale (Schurrager & Schurrager, 1964) represents a noteworthy attempt to develop a performance test for the blind, it does not evolve from a specific theory of development; the scales are modifications of the WAIS and are appropriate only for subjects above 16 years of age.

Work by Harley (1963) prompted the suggestion that a unique program is needed by the blind child if he is to learn simple concepts which sighted children develop through incidental learning. Manipulation of objects enables the blind child to gain the skills in manual inspection which are imperative for cognitive development. However, since the blind child lacks one source of sensory input, his perceptual processes are deficient (Barraga, 1973).

For Piaget, intelligence is a theory of interaction, a system of hierarchical development organized in "general structures" which do not become fully operational until the end of a long and slow genetic process (Hatwell, 1966). Piaget has maintained that a child must experience things for himself to obtain understanding of them, before he can really "know" them. To know an object or event is not simply to look at it or hear about it and make a mental image or copy of it; rather it is to act on it, modify it or transform it and, in the process, to understand the way the object is constructed. This act is an operation, and an operation is the essence of knowledge (Copeland, 1970). Sight constitutes one of the principal means of appraising the surrounding world; visual stimuli are by far the most numerous and most varied stimuli. Sight and cognition are so interrelated in the popular mind that "to see" is equated with "to know" or "to understand." For this reason laymen at times consider blindness indicative of mental retardation, as though the loss of sight rendered impossible any intellectual acquisition.

A single experience, no matter how successful, is not enough to build a reliable concept (Mukerji, 1969). A child cannot move ahead toward abstract structure and reasoning without a broad base of direct encounters from which to abstract and generalize. In order to obtain this broad base, he must make many approaches from many angles over a period of time. Through these numerous approaches the concept acquires a measure of stability. When considering implications to be derived from Piagetian research for training programs for blind students, Hatwell (1966) noted that the blind child "operates within a verbal system which is handled more easily than is the world of objects, but which, if its tie to reality is lost, becomes a closed and necessarily inadequate system." In her analysis, blindness introduces a "rupture of equilibrium between assimilation and accommodation." Although the blind child has the intellectual instruments necessary for the integration of outside data, he "is deprived of a great deal of the means by which a sighted child controls his adjustment to reality." Blind children assimilate perceived data through generalizations which long remain maladaptive and deforming. Hatwell (1966) notes that blindness seriously impairs the ability to accommodate because less pressure is exercised by the outside world; nonetheless, the constitution of logical structures can be achieved by the blind. She concludes that "there should be effort to promote interaction between the child and his environment, effort which would emphasize the tactual perceptive exploration of objects to counter-balance, in part, the negative effects of sensory deprivation, a deprivation which does not impair the intellectual operative ability of the child."

However, studies by Berlá (1972), Hammill and Crandell (1969), and Nolan and Morris (1969) found that the ability to discriminate tactually, rather than occurring spontaneously in blind children, was developmental in nature, was related to cognitive ability, and was affected by such factors as intensity of tactual stimulations (sharpness), intensity variations or quality of intensity, early childhood experiences, concepts about space and spatial relationships, and geography of the immediate environment. In another study which incorporated tactual ability, performance of the sighted subjects showed greater articulation than the performance of the blind; also marked individual differences were found in the extent to which cognitive functioning of the blind subject was relatively articulated or relatively global (Witkin, Birnbaum, Lomanoco, Lehr, & Herman, 1968).

The difficulty which blind persons have in perceiving of themselves as agents in control of their environment has been noted by Land & Vineberg (1965). According to work accomplished by Almy, Chittenden, and Miller (1966) Piaget's tasks tended to give an advantage to the child who approached his environment analytically in contrast to the one whose approaches were more global and associative. Although this could contribute to the poorer performance found in the blind in the present study, the well-constructed Piaget interview provides a picture of the way the child organizes (or fails to organize) his information. The essence of Piaget's method is to assess the child's readiness to make a particular discovery and then to relate his educational experience to that readiness in order to assure that he will have the necessary intellectual content and cognitive abilities (Almy, et al., 1966).

Research by Piaget (1960, 1962) has established that cognitive development proceeds through a hierarchical sequence of stages; the work is regarded as one of the major psychological contributions of the century (Brown, 1965). Intelligence is seen as a process of adaptation and organization. Two important features in Piaget's theory are: (a) the continuous extension of previous structures to accommodate new functions as well as the emergence of new structures as circumstances change, and (b) the development of these extensions in a pattern through which the total organism adapts to the environment (Baldwin, 1967; Berlyne, 1957; Flavell, 1963; Hunt, 1961; Inhelder, 1953; Inhelder & Piaget, 1958; Maier, 1965; Piaget, 1960; Stephens, 1966; Sullivan, 1967; & Tuddenheim, 1966). Change from a reflexive to an inventive organism is defined by four stages which can be further divided into sub-stages. The four stages of cognitive development posited by Piaget are:

1. Sensory-motor (approximately birth to 2 years). The period is characterized by development from a state of reflex activity to an organized sensory-motor action system which permits increasing mastery of objects in the environment.

(a)	Reflexive (0-1 month)	Simple reflex activity; example: kicking
(b)	Primary Circular Reaction (1-4.5 months)	Reflexive behavior becomes elaborated and coordinated; example: a thing grasped becomes something to suck
(c)	Secondary Circular Reaction (4.5-9 months)	Repeats chance actions to reproduce an interesting change or effect; example: kicks crib, rattle shakes, so kicks crib again
(d)	Coordination of Secondary Schema (9-12 months)	Acts become clearly intentional; example: reaches behind cushion for ball

(e)	Tertiary Circular Reactions (12-18 months)	Discovers new ways to obtain desired goal; example: pulls pillow nearer in order to get music box resting on it
(f)	Invention of New Means through Mental Combinations (18-24 months)	Invents new ways and means; example: uses stick to reach desired object

2. Preoperational (approximately 2 to 7 years). The child does not use logical operations in his thinking. Instead, he is perceptually oriented, makes judgments in terms of how things appear, and generally can deal with only one variable at a time. Thought at this level of functioning is rigid.

(a)	Preconceptual (2-4 years)	Capable of deferred imitation and of verbal expression, but speech is repetitious; frequent egocentric monologues
(b)	Intuitive (4-7 years)	Speech becomes socialized; reasoning is egocentric; example: "to the right" means to his right

3. Concrete operations (approximately 7 to 11 years). Mobile and systematic thought organizes and classifies information. Thought is no longer centered on a particular state of an object. Instead it can follow successive changes through various types of detours and reversals, but because the operations are tied to action, they are concrete rather than abstract.

4. Formal operations (generally achieved after age 11). The stage is characterized by the ability to think abstractly, formulate hypotheses, engage in hypothetico-deductive reasoning, and check solutions. Thought now directs observations.

Inhelder (1953) cited the following criteria to define each stage:

1. Each stage contains a period of formation and a period of attainment.

2. The starting point for a higher stage is marked by the attainment of an earlier stage.

3. The order of the stages is constant although the age of attainment can vary.

4. The attainment of higher stages necessitates that preceding structures be integrated or become a part of the later structures.

Initially the invariant developmental sequence described by Piaget was questioned. However, when Elkind (1961a, 1961b, 1961c,

1967) used conservation experiments to study the growth of thinking, he found that persons do follow the stages posited by Piaget. Furthermore, he like Inhelder (1968), found that the attainment of conservation of substance preceded weight, and that weight preceded volume. This sequence of mastery also was confirmed by Smedslund (1961), Lovell and Ogilvie (1960), Stephens, et al., (1969), and Stephens (1972).

Sensory disturbance peculiar to those born blind hampers development of sensory-motor schemes from the outset and slows down general coordination as well as "concepts and behavior patterns essential to later successful school performance" (Taylor, 1973, p. 159). Because the blind are retarded in the acquisition of operations which precede concrete reasoning, they would be expected to be retarded in their achievement of operational processes which characterize the third stage of cognitive development, the concrete stage (Stephens, 1972). In a conservation study by Miller (1969) blind students, ages 6 to 10 were found to experience the same hierarchical stages of Piagetian reasoning as their sighted peers; however, development was delayed. In similar studies Gottesman (1971, 1973) and Tobin (1972) also found the same developmental patterns, but again the rate of development was slower for the blind at the younger age levels. Brekke, Williams, and Tait (in press) determined three variables significantly related to performance on "conservation tasks"; these were age, sex, and blind living at home vs. blind living in an institution.

Work by Piaget and Inhelder (1959) on the origins of classification in subjects 4 to 12 years old, indicated three main classificatory stages. During Stage I, material was organized into figural collections but action was characterized by lack of planning and anticipation. At Stage II, anticipations were observed and the child could construct non-graphic collections. Finally, during Stage III, the notions of inclusion-relation and class hierarchies were acquired. Boldt (1969) found similar stages in the development of scientific thinking in blind children and adolescents. He concluded that the development of relationships which blind children have in conjunction with the scientific and technical environment could be understood as a process of progressive dissociation of subject and object, and that only near the end of this dissociation process is real scientific (formal) understanding attained.

When the invariant sequence of classification skills was studied by Kofsky (1966) through use of 11 classification tests, the observed order was only partially in accord with Piaget's theoretical framework. Significant correlations, however, were revealed between the subject's chronological age and mastery of the task. Data from a study of classification and seriation skills in blind and sighted subjects served to indicate that on both tasks blind and sighted children improved with age, but the sighted in general performed more adequately than the blind (Friedman & Pasnak, 1973b). In a followup study which attempted to accelerate acquisition of classification skills in blind children, Friedman and Pasnak (1973a) found the blind subjects "...caught up with their sighted peers, even though they did not learn the concept perfectly" (p.337). Using the Modified Kofsky Battery, Higgins (1973) studied the development of classification in congenitally blind children. Taken collectively, the results supported Piaget's thesis that there are stages in intellectual development. The deficiencies in classificatory behavior identified in the study, however, appeared to be perceptual and symbolic in origin rather than intellectual. This suggested that the blind child is not necessarily handicapped in developing intellectual structures but is handicapped in obtaining data from his surroundings.

Piaget's (1967) theory of space suggests two types: sensorimotor space and representational space. Development of sensorimotor space begins prior to or at approximately two years of age (along with the advent of symbolic function). Both knowledge of objects which results from direct contact with them and perception are basic to sensorimotor space and involves imagination or evocation of objects in their absence. A systematic attempt to replicate Piaget's and Inhelder's work (1967) on spatial concepts was conducted by Laurendeau and Pinard (1970). They found that the development of the five concepts (i.e., stereognostic recognition of spatial objects and space, construction of a projective straight line, localization of topographical positions, concepts of left and right, and coordination of perspectives) assessed in the study generally followed the same steps as those identified by Piaget; thus their findings supported Piaget's hypothesis of developmental stages. Use of factor analytic techniques by Mahaney and Stephens (1971) identified two spatial orientation factors which did not have major loadings from other Piagetian reasoning tasks. These results suggested that spatial disorientation did not imply poor performance in other areas of reasoning. Since blindness limits the individual's spatial perception, it may be expected that the blind child would experience difficulty in this area of intellectual functioning. Although the area is one of prime importance for the blind individual in his development of mobility skills, only Swallow and Poulsen (1972) and Swallow (1973) have reported on studies of visually limited (visual acuity range was 20/70 to 20/400) children's concept of space. Review of the performance of the 10 subjects included in the Swallow and Poulsen (1972) study revealed nine mastered topological space, while none mastered all tasks of projective and Euclidean space at the concrete operation stage. Therefore, Swallow (1973) concluded that "lack of sufficient physical encounters is probably more detrimental than the loss of vision" (p. 69).

Prior studies of reasoning in blind children have dealt primarily with the area of conservation (Miller, 1969; Gottesman, 1971, 1973; Tobin, 1972; Brekke, Williams, & Tait, in press). Research which analyzed the development of reasoning in areas other than conservation seemed to be totally lacking. Besides the studies of classification by Friedman and Pasnak (1973a, 1973b) and Higgins (1973) and of spatial relations by Swallow and Poulsen (1972) and Swallow (1973), only the study by Hatwell (1966) and the present study have attempted to examine extensively several areas of reasoning in blind children.

Moral Judgment

Piaget holds that the same process which engenders rationality in general is responsible for the development of morality. Therefore, a theoretical tie exists between reasoning and moral judgment. For this reason, the present study sought to identify the development of moral judgment in the congenitally blind, an area which previously had been neglected.

To determine the limit of moral judgment achieved by a subject, Piaget typically confronts the child with a story that demands a decision involving moral judgment. The subject's reply denotes his level of functioning in this area.

Piaget viewed morality as a formative process and identified three phases:

1. Individual caprice or egocentrism; without rules; acts on instinct and impulse; moral constraint from adults leads to heteronomy and moral realism
2. Social contraint; rules imposed by others are external and are narrowly and rigidly interpreted
3. Equilibrium of agreement; cooperation and regard for equity; autonomy or self-rule occurs with the progressive interiorization of rules (Piaget, 1962; Bull, 1969b)

Following Piaget's initial work, The Moral Judgment of the Child (1962), which demonstrated the development of moral maturity, Eysenck (1960) conducted a study of the development of moral values in children, and Medinnus (1962) reported objective responsibility in children. Testing of Piaget's theory of moral judgment by MacRae (1954) substantiated the idea of three-phase development of moral judgment. Kohlberg (1973) also found that universal patterns or principles of moral thinking progress through an invariant order.

Findings which issued from work on the moral judgment of subnormals by Abel (1941) suggested that Piaget's postulates extended to the area of retardation. Findings by Bobroff (1960) demonstrated that thought, social behavior, and ego development of educable mentally retarded children followed the Piagetian sequence; however, this research did not extend the analytical approach to other areas of reasoning or moral behavior. Although interest was evidenced in the area, the nature of the relationship among reasoning, moral judgment, and moral conduct was unexplored. Subsequent to Piaget's work, research has shown intelligence and social class to be related to the type of moral judgment displayed by normal children (Johnson, 1968).

Data on the moralistic judgments of 173 school children ages 7 to 12, provided by Whiteman and Kasier (1964), served to suggest that maturity of moral judgment was a function of increase in mental age rather than advance in chronological age alone. Additional findings implied that moralistic judgments were not related to teacher ratings, sex, or membership in scouting organizations. By contrast, in a series of studies by Durkin (1959a, 1959b, 1959c) which explored the acceptance of reciprocity as a justice principle in school age children, reciprocity was unrelated to IQ. Contrary to Piaget's contention that reciprocity develops as a function of age, an inverse relationship was found. Kohlberg (1958) extended consideration of moral judgment to the adolescent period of development and choice in persons ages 10 to 16.

As acknowledgement of the need to ascertain relationships between various aspects of moral judgment was assessed by Lerner (1937), a relationship between the child's development of morality and an increase in ability to see social situations from the viewpoint of others was found. In research by MacRae (1954) which utilized moral judgment questions derived from work by Piaget and Lerner, three relatively independent factors, rather than a single moral judgment factor, were derived. The factors were termed (a) intentions-consequences, (b) punishment, and (c) perspective.

Work by Berkowitz (1964) failed to provide evidence for a general moral judgment factor at particular age levels; there also was suggestion that age changes and accompanying maturity in moral judgment do not always substantiate Piaget's theory. Numerous factors involved in the moral judgment process alter with age changes, according to studies by Medinnus (1957), MacRae (1954), and Lerner (1937). Cross-cultural research by Bronfenbrenner (1962) suggested that as the locus of the studies in moral judgment moved farther from the European mainland, there was an accompanying decrease in the empirical confirmation of Piaget's formulations. After extended research in the areas of moral development, Bull concluded that Piaget's "overriding concern to prove his preconceived theory leads to a distortion of the evidence and so to a false pattern of (moral) development. Yet he does provide ample empirical evidence to justify the description of development in terms of stage" (Bull, 1969b, p. 27). Turiel (1973), however, noted that within a developmental sequence, each succeeding stage represented a more adaptive and equilibrated state than its predecessor. This implied that the child's primary motivation was competence rather than approval from family or peers.

Attempts to assess growth in various areas of moral judgment have provided proof that: (a) significant change in the view of law took place in normals during the adolescent years, particularly years 13 to 15; (b) development of the principle of intentionality in moral judgment continued through adolescence (Breznitz & Kugelmass, 1968); (c) concepts of fairness, generosity, and selfishness were developmental in nature (Shure, 1966); (d) awareness of rules developed through a series of stages (Piaget, 1962); and (e) with age there was a decrease in authority-type responses and a concomitant increase in reciprocity responses (Lee, 1968).

Comparison of sex differences in moral development have not supplied conclusive generalizations. No siginficant sex differences were reported in children's responses to moral judgment stories (Durkin, 1960). In contrast, striking differences presented themselves in Birnbaum's (1968) assessment of anxiety and moral judgment in early adolescent normals; girls generally were more rigid in adhering to rules. Similarly, when introduced to simulated social situations females were found to be more conforming than males (Iscoe, Williams, & Harvey, 1963). After his comprehensive analysis of moral judgment, the emerging pattern presented by Bull (1969a) was one of a "climateric stage of development between 11 and 13 years for both sexes, but with immense differences between the sexes." Girls were found to be early developers while boys were late developers in moral judgment. At 17 years the sexes approximate each other, although girls remain slightly in advance.

The previous longitudinal study which examined the development of moral judgment in normals and retardates (Stephens, et. al., 1969; Stephens, 1972) found developmental trends on most variables for both groups. Differences among the three age groups of retardates indicated that development in moral judgment does occur and continues to occur in retardates as they enter young adulthood.

Since no attempt had been made to assess the moral development of the congenitally blind, the present study sought to examine this area of functioning and to relate moral development to the cognitive development of the blind.

Moral Conduct

Piaget theorized a three phase development of moral judgment: (a) moral constraint leading to heteronomy and moral realism, (b) interiorization of rules, and (c) achievement of cooperation leading to autonomy. Based on this theory, R. F. Peck and Havighurst (1960) derived five character types:

1. Amoral: a person with inexact perception, paradoxical and nullifidian actions, and a child-like inability to govern them

2. Expedient: a person who lived in the immediate present, who did not perceive the long-range results of his behavior, and who possessed few moral inner drives

3. Conforming: one who lacked self-dirction, who consented to the dictates of his associates in a placid and uncensorious manner

4. Irrational conscientious: a person who ascribed to and maintained an unswerving life style which appeared to consist of strongly organized "don't's" which determined his behavior

5. Rational altruistic: a person capable of a continuing maturation, one who maintained rational control of his actions, who sought the well-being of self and others

When these character types were applied to observed behavior, it was found that an adult tended to maintain with persistence his sets or basic feelings toward life, and that a person's moral conduct could be classified in terms of the level of character development he had achieved.

Studies by Hartshorne and May (1928, 1929), conducted almost a half-century ago, have remained hallmarks in research on moral conduct, principally because of their skillful adaptation of measurement procedures to research objectives. The technique which they used placed subjects in temptation situations in order to observe their propensity for impetuosity and rapacity versus their powers of self-restraint and inner discipline. Results from these observations provided scientific information on honesty, cooperation, and persistence. These early findings suggested that moral conduct was situationally determined rather than generalizable; i.e., suppression of prohibited behavior in one type of situation was not found to generalize to other types of situations. However, when Maller (1934) subjected the Hartshorne and May data to factor analytic techniques, a common factor, suggesting delay of gratification, emerged. Still later when the same data was reanalyzed by Burton (1963), more consistency in behavior was revealed (Aronfreed, 1968).

Findings from a more recent study by Grinder (1960, 1961) which used contrived temptation situations to study honesty served to indicate a moderate generality of honesty. In addition, work by Barbu (1951) tended to suggest that honesty was a general personality trait and that tests of deception could have considerable value. In a review by Kay (1968) of studies designed to examine the specificity versus generality dichotomy, cluster performance supplied a more valid interpretation; i.e., in a variety of situations involving similar aspects of moral conduct, there was significantly consistent behavior.

Several attempts had been made to determine organismic and environmental variables which predispose a student to cheat

(Drake, 1941; Howells, 1938; Parr, 1937; Woods, 1957). Effort to demonstrate relationships between achievement, personality, and cheating produced conflicting results. Kanfer and Durerfeldt (1968) reported a decrease of cheating scores as a function of increasing age when they assessed the roles of age and class standing as determinants of cheating. They concluded that an interaction existed between situational variables and individual differences in cheating behavior. The specific type of cheating and the tendency to cheat in college students were found to relate to intellectual, demographic, and personality characteristics of the subject (Hetherington & Feldman, 1964).

To determine whether growth in moral conduct parallels growth in moral judgment, contrived situations frequently were created which permit observance of ongoing behavior. Level of resistance to temptation was determined by Walsh (1967) in a situation which contained attractive, but untouchable objects. Kay (1968) used adult-present versus adult-absent conformity to rules as a measure of self-regulatory behavior. Dilemma situations involving cross pressures between adult-approved and peer-held standards were presented to facilitate discussion and resolution of conflicting conduct by Devereux (1970). LeFurgy and Woloshin (1968) were able to modify an individual's level of moral judgment through experimentally induced social influence. In a study by J.R. Peck and Stephens (1964) which followed R. F. Peck's and Havighurst's (1960) approach, it was found that over an extended period young adult male retardates' behavior could be classified in terms of levels or types of character development or moral conduct. However, the observed levels represented their adult performance; whether the attainment pursued the hierarchical sequence of development postulated by Piaget was undetermined.

In a subsequent study in which the performance of delinquent subjects was compared with that of mentally retarded subjects on Piagetian reasoning measures, no significant differences existed between the delinquent and the mentally retarded subjects although the two groups differed significantly on IQ. When comparison was made of normals and delinquents on measures of moral judgment, no significant differences occurred; i.e., the delinquent group could verbalize what should be done as well as could the normal group. Thus it was demonstrated that the stage of moral judgment verbalized by the delinquents was not related to their own moral conduct (Miller, Zumoff, & Stephens, 1974).

Developmental changes in the consistency between moral judgment and moral conduct were found by Beller (1949) when 9, 12, and 15-year-old boys were compared. In a study involving 10 to 14 year old boys, Kohlberg (1963) found measures of moral judgment correlated .31 with teacher ratings of conscience and conformity.

However, these studies gave little consideration to the possibility that moral conduct may follow a developmental sequence. In contrast, the Stephens, et. al., (1969) and Stephens (1972) studies indicated this aspect of behavior was developmental in nature; viewing normals and retardates separately, each group showed a significant decrease in acts of misconduct as they increased in age. At each level misconduct scores for retardates were approximately twice as great as normals. Yet when retardates were compared with normals of similar mental age, there were no significant differences. These results strongly suggested that moral conduct followed a developmental sequence. Since research in this area seemed to be totally neglected for the congenitally blind, the present study sought to examine relationships among reasoning, moral judgment, and moral conduct.

CHAPTER II - METHODS

Project Program and Professional Staff

The research program consisted of three phases:

1. data collection (assessment of subjects on measures of reasoning, moral judgment, and moral conduct)
2. data analysis
3. dissemination of findings (final report, presentation at professional meetings, preparation of articles)

Professional staff consisted of:

1. Principal Investigator: Will Beth Stephens, Professor of Special Education at Temple University. Approximately one-third of her time was devoted to the project. Training in Piagetian assessments was received while on a VRA Post-Doctoral Fellowship at the University of Geneva.
2. Research Associate: Katherine Simpkins, received an M.Ed. in Special Education and was working in the Temple University Special Education Doctoral Program with a major in research. Her major training and experience has been in education for the retarded, the blind, and in Piagetian assessment techniques.
3. Senior Secretary: Stella Vail, B.A. in Education, has had experience in elementary teaching as well as secretarial work. She has served as Executive Secretary and General Office Manager in charge of staff and operations.
4. Consultants:

   Natalie Barraga, Professor of Special Education - Area of Visually Handicapped, The University of Texas, reviewed data in terms of implications for intervention programs.

   John Crandell, Professor of Special Education - Area of Visually Handicapped, Brigham Young University, assisted in evaluation and interpretations of results for education of the blind. Originally he had assisted in the adaptations of the instruments in the study.

   Francis Lord, Professor of Special Education, University of Arizona, had experience with and had contributed to programs for the visually handicapped. This knowledge assisted in evaluation of the present study's findings for programs for the blind.

Perla Tait, Assistant Professor of Special Education - Area of Visually Handicapped, Temple University, assisted in critiquing the final report and considered implementation of findings in programs for the visually impaired.

Population and Sample

The sample (N=150) was composed of 75 sighted (IQ 90-110) male and female subjects, and 75 congenitally blind (IQ 90-110) male and female subjects. IQ was determined by the WISC or WAIS Verbal for both sighted and blind subjects. The congenitally blind (persons blinded before the age of 4 years) had no functional vision, i.e., light perception or less. Multiply-handicapped congenitally blind were not included in the sample. The two subsamples, blind and sighted, were divided into cross-sectional samples of three age ranges:

1. 25 blind subjects, ages 6 to 10 (13 male, 12 female)
   25 sighted subjects, ages 6 to 10 (13 male, 12 female)
2. 25 blind subjects, ages 10-14 (12 male, 13 female)
   25 sighted subjects, ages 10-14 (12 male, 13 female)
3. 25 blind subjects, ages 14-18 (13 male, 12 female)
   25 sighted subjects, ages 14-18 (13 male, 12 female)

The sighted subjects, randomly drawn from public school classrooms in the Bucks, Montgomery, and Philadelphia County School systems in Pennsylvania, were those used previously in the Stephens, et al. study (1969). Their assessment scores had been obtained and were on file.

Originally the blind subjects were to have been randomly drawn from the population of students in the various residential and day school programs for the education of the blind in New Jersey, Pennsylvania, and Virginia. However, because of the multiple screening criteria and because of the limited population of children with severe visual defects, it was necessary to extend the geographical range and to draw the random sample from the population of blind students enrolled in public and private residential and day school programs in an eight state area. Distribution of the blind sample was:

	Residential	Day School
New York	5	
New Jersey*		13
Pennsylvania	15	6
Delaware*		
Maryland	7	
Virginia	10	1
West Virginia	12	
North Carolina	6	
	55	20

* New Jersey and Delaware had no residential schools for the blind, and none of the Delaware students in the day school programs qualified. However, students from these states who were enrolled in residential schools in the six other states were included in the study.

Social status as measured by Warner's Index of Social Status (McGuire & White, 1955) was determined by sub-samples (sighted and blind) of specific age groups. The blind sample was found to be upper-lower class and the sighted sample, lower-middle class.

Brief Description of the Setting

Interviews with sighted subjects were conducted in a specially designed mobile laboratory which contained two testing cubicles equipped with one-way viewing screens. Interviews with blind subjects were conducted in a room in the child's school, or in nearby facilities. Observation of blind subjects during specific moral conduct tasks was accomplished by watching through a window or a door.

Description of Variables Being Studied

Thirty-two reasoning, moral judgment, and moral conduct variables were employed to determine the relationships among these three areas, and to compare development in blind and sighted samples. Relationships among scores on these variables and standard measures of intelligence and achievement were examined through use of sub-scores on the Wechsler Scales and on the Wide Range Achievement Test (spelling, arithmetic, and reading sub-tests). Scores from Warner's Index of Social Characteristics were used to determine the social status of the two sub-samples.

In the reasoning, moral judgment, and moral conduct experiments, the subject (a) was presented with a problem which involved manipulation of objects, or (b) formulated an opinion concerning a narrated situation, or (c) was observed in a structured situation which was designed to assess his behavior.

Adaptation of the reasoning, moral judgment, and moral conduct instruments for use with the blind was accomplished by Simpkins and Stephens (1970). Pilot use of the adaptations had been carried out at the Overbrook School for the Blind and at Temple University. Prior use of the conservation experiments was accomplished by Miller (1969) at Temple University and Overbrook School for the Blind; test-retest reliability, five week interval, ranged from .74 to .84. Earlier work by Hatwell (1966) also provided evidence of successful adaptation and use of Piagetian reasoning assessments for work with the visually handicapped.

The reasoning experiments provided measurement of: (a) conservation, (b) logic-classification, (c) operativity and symbolic imagery, and (d) formal operations.

The four areas of moral judgment measured were:

1. Relation between practice and consciousness of rules
2. Ability to consider intent of teller rather than extent of deviation from truth in determining culpability of falsehoods
3. Maturity in evaluation of objective versus subjective responsibility
4. Regard for punishment by reciprocity which is derived from ideas of equality rather than expiatory punishment which is based on retributive justice

Structured situations were designed to elicit acts of moral conduct. In these situations it was possible to measure observed truthfulness, persistence, self-control, and cooperation.

Descriptions of the variables are presented under the headings of reasoning, moral judgment, and moral conduct.

Reasoning Variables

Prior to the administration of any experiments, each subject responded to a measure designed to evaluate and promote his understanding of such relational terms as "more," "less," "same," "different," and "bigger" (Griffiths, et al., 1967). In the administration of conservation experiments:

1. opportunity was provided for the subject to become familiar with the experimental materials
2. the experimenter noted whether the child indicated the initial equality of the comparison objects
3. the child judged equality or inequality of the objects after each transformation
4. the child was asked to explain his answer to each question of judgment ("Why?" "Tell me more." "How do you know that?" etc.)

The name and abbreviation of each reasoning task plus a brief description of the original task, and of the adaptation required for use with blind subjects, are presented in Table 1.

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Insert Table 1 about here

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TABLE 1

Descriptions of the Reasoning Tasks

Subtest	Abbreviation	Original	Adaptation for Present Study
		Conservation	
Conservation of Substance	Con. Sub.	After the child agreed that two 6" balls had same amount of clay, one ball was successively transformed into a "hot dog," a "pancake," and into a dozen small pieces. In each case, the child compared the amount of clay in the transformed ball with that in the unchanged ball.	Transformations from ball to "hot dog," from ball to "pancake," and from ball to small pieces were made by the subject.
Conservation of Weight	Con. Wt.	Two clay balls of equal weight were placed on a scale. After the child agreed to their equality, the transformation to "hot dog," "pancake," and a dozen pieces were made. In this instance, however, the child judged the weight rather than the size of the transformed ball.	Transformations were made by the subject.
Conservation of Volume	Con. Vol. Con. Vol. (4) (Second part of the experiment)	After the youngster agreed to the equality of two clay balls and the equality of two beakers of water, one clay ball was successively transformed into a "hot dog," "pancake," and small pieces and the child was asked whether the water levels in the beakers would remain the same if the transformed ball was placed in one and the non-transformed ball in the other. In the second part of the experiment a metal ball of the same volume replaced one of the clay balls.	All transformations were made by the subject.

TABLE 1 - Continued

Subtest	Abbreviation	Original	Adaptation for Present Study
Dissolution of Sugar	Sugar Wt. (1) Sugar Sub. (2) Sugar Vol. (3)	Two identical beakers containing equal amounts of water were displayed. Later a cube of sugar was placed in one beaker and the child was asked: (1) if the two beakers still weighed the same, (2) if, when dissolved, there was as much sugar in the water as there had been in the cube, and (3) if the water levels in the two beakers remained the same.	The child weighed the two beakers of water and two sugar cubes to establish equality of weight. He also established equality of water levels either by judging from the placement of rubber bands around the beakers to indicate water levels or by feeling the water in the glasses. The subject dropped one sugar cube in the water; the other sugar cube remained on the table.
Dissociation of Notions of Weight and Volume	Wt. & Vol.	After the child agreed that two identical plastic beakers contained the same amount of water, cylinders varying in weight and material, but of equivalent size, were placed in each beaker. Prior to each immersion, the child was asked to predict whether the water levels would remain the same after the cylinders were placed in the water. In a further task, the examiner placed a large cylinder in one beaker and the subject was requested to select from a variety of smaller cylinders, the cylinder or cylinders which, when placed in the second beaker, would cause the water in the second beaker to rise to the same height as the water in the first.	At the opening of the experiment the subject was encouraged to tactually explore each of the cylinders.

TABLE 1 - Continued

Subtest	Abbreviation	Original	Adaptation for Present Study
Conservation of Length	Con. Len.	The child chose two rods of equal length (8 inches) from a group of 6, 8, and 10 inch rods. After he confirmed the equality of the two 8 inch rods, the rods were placed parallel to each other. The experimenter then moved one rod 4 inches to the right, then 4 inches to the left, and finally both rods were moved simultaneously; one 4 inches to the right, the other 4 inches to the left. After each shift, the child was asked if the rods were the same length.	When the rods were placed parallel to each other, the child was asked to place both hands on top of the rods in order to observe the movement tactually. Rods were slightly flattened on one side to prevent rolling.
Conservation of Length - Rod Sections	Rod Sec.	The procedure was similar to the above except four rods, each 4 inches long, were compared to one 16-inch rod. The transformations consisted of placing the four small rods in a "W" shape, an "M" shape, and a "--$_V$" shape.	Rods were slightly flattened on one side to prevent rolling. The child placed both hands on top of the rods.
Conservation of Liquids	Con. Liq.	Two identical beakers were filled with equal amounts of water (one clear water, the other colored water). After the child agreed there was the same amount of water in each beaker, the content of one beaker was poured successively into a tall cylinder, a short flat beaker, and four small beakers of equal size. After each transfer, the child was asked whether the containers had the same amount of water.	Clear water was used in both beakers. The child did all pouring, but when necessary was assisted by the examiner.

TABLE 1 - Continued

Subtest	Abbreviation	Original	Adaptation for Present Study
One for One Exchange	1 to 1	In this task, the experimenter had a "store" (a basket containing 12 packages). The child was given eight dimes and instructed to exchange a dime for each package he bought until all the money was spent. At the conclusion of his purchases, the child was asked whether he had the same number of packages as the experimenter had dimes. Later the roles (shopper, grocer) were reversed.	None
Term to Term Correspondence	Term	After nine egg cups were arranged in a straight line (with 1 inch intervals between each) the subject was requested to place an egg in front of each egg cup. After he agreed that there were the same number of eggs as egg cups, the egg cups remained in place but the eggs were moved much closer together. Immediately following each transformation, the child was asked whether there were as many eggs as egg cups.	To promote ease in tactile examintion, checkers were substituted for the egg cups and poker chips for the eggs. The examiner manipulated the child's hands as he made the transformations.

TABLE 1 - Continued

Subtest	Abbreviation	Original	Adaptation for Present Study
		Logic - Classification	
Classification - Animals	Class (3) Class (4) Class(5a) Class(5b)	Task requirements were to sort a set of 17 pictures into three related piles (ducks, birds, and animals). After the initial classification, the subject was questioned on class inclusion and possible class extensions.	Fresh foods were sorted into three related piles (apples, fruits, and foods.) After the initial classification the child was questioned on class inclusion and class extension.
Class Inclusion - Beads	Beads	A box containing 10 wooden beads, eight red and two yellow , was displayed, and the subject was required to judge whether there were more wooden beads or red beads in the box. Additional questions were derived from modifications of the basic experimental arrangement.	The box contained 10 beads, eight of one shape and two of an obviously different shape. The child chose a name for each shape and his attention was drawn to the fact that all the beads were made of wood.
Changing Criterion	Ch. Crit.	Forty cardboard geometric figures were to be sorted into two stacks; 20 figures were round, 20 square; 20 figures were red, 20 blue; 20 figures were large, 20 small. After the subject explained his classification, he was encouraged to sort on another criterion. The procedure was repeated for a total of three resorts. Finally, the subject was asked to recall his initial classification.	The 20 red figures were replaced by 20 sandpaper figures and the 20 blue figures by 20 smooth figures.

TABLE 1 - Continued

Subtest	Abbreviation	Original	Adaptation for Present Study
Intersection of Classes	Inters.	Two rows of pictures were presented. One, a horizontal row, contained five pictures of the same object but each picture a different color; the other, a vertical row, contained five pictures of the same color but of different objects. Instructions were to pick a single picture (from an assorted array) which would relate appropriately to both rows if it were placed at the intersection of the two rows.	Two rows of wooden forms were presented. On one row were four wooden cutouts of different shapes but the same texture. The other row contained four wooden cutouts, the same shape but with different textures. Instructions were to pick a piece from an assorted array to place at the intersection of the two rows which would relate appropriately to both rows. Textures used were those found most highly discriminable in a study by Nolan & Morris (1969).
		Operativity and Symbolic Imagery	
Rotation of Squares	Sq. Rot.	A board on which two cardboard squares (one red, one blue) were mounted was presented to the subject and he was required to draw the anticipated rotated positions of the red square. In a second procedure, the subject was asked to select the one drawing which represented the way the red square would appear at a specific position as it was rotated clockwise around the fixed point.	The squares of two colors (red and blue) were replaced by squares of two textures (smooth and rough) which were tactually inspected. Because no method was found to adapt the drawing of anticipated rotations, the part of the test which required drawing was eliminated.

TABLE 1 - Continued

Subtest	Abbreviation	Original	Adaptation for Present study
Rotation of Beads	Bead Rot.	A stiff wire on which three different colored beads were mounted was exhibited. Following this the beads were placed in a tube and the tube was rotated. The task was to judge which of the three beads would emerge first from the tube.	Three differently shaped beads (strung consecutively on a stiff wire) were tactually examined by the subject and given names. The subject assisted in placing the beads in the tube and placed his hands on the examiner's hands in order to follow the rotations.
Transfer from Two to Three Dimensions	2-3D	An irregularly shaped cardboard frame was produced which had a thumb tack in the center. The subject was asked to place a tack in exactly the same spot on an identically shaped board. Spaghetti was provided to serve as a measuring device. Additional tasks involved oval and rectangular shaped boards. A final task required the subject to place a ball inside a wooden box-type frame in exactly the same spot occupied by a ball in an identical wooden box-type frame. Again, spaghetti was used as a measuring device.	None

TABLE 1 - Continued

Subtest	Abbreviation	Original	Adaptation for Present Study
Changing Perspectives, Mobile and Stationary	Pers. Mob. Pers. Stat.	A cardboard tower, house, and tree were placed in specified positions on a table. After moving to consecutive positions around the table, the subject was required to find a drawing which represented the complex when viewed from each of eight perspectives. In a second task, the subject remained seated, and was asked to indicate where a doll would have to stand in order to see the complex at a perspective which corresponded to the perspective depicted in a drawing shown to him.	Raised line drawings of the eight perspectives were used in the first and second parts. In the second part, the doll was eliminated and the child asked where he would have to stand in order to have the perspective correspond to the drawing shown to him.
		Formal Operation	
Combination of Liquids	Chem.	Five identical bottles, each filled with a colorless liquid were placed on a table. Three bottles contained chemicals, the fourth bottle contained a neutralizer, and the fifth water. Combined liquids from three would produce a dark blue color. The task was to determine which of the three liquids should be combined to obtain the dark blue color.	Five identical bottles were placed on the table. The subject was told his task was to find which of the liquids , when combined, would produce a dark blue color. When the subject used the correct combination of bottles he was informed that he had obtained the correct color.

Scoring procedures. Two types of scores were assigned to the reasoning assessments: dichotomous (pass-fail) and point scale scores. The explanation given by the subject for his response was scored on a one-to-nine point scale composed of the following intervals:

1. Fail
2. Oscillation - Incorrect: Initial correct response is altered to an incorrect one
3. Oscillation - Correct: Initial incorrect response is replaced with a correct one
4. Pure intuitive: The correct answer is given but reason for the statement is lacking
5. Concrete intuitive: The correct answer reflects perceptual influence
6. Concrete without reversibility: The correct response addresses consideration to pertinent elements, but there is no indication of reversibility of thought processes
7. Concrete with reversibility: Responses indicate an ability to reverse thought processes
8. Concrete merging into formal: Answers suggest transition from concrete to abstract thought processes
9. Formal: Indication of ability to solve problems without recourse to concrete materials

Moral Judgment Variables

The name and abbreviation of each moral judgment task plus a brief description of the original task and any adaptations made for use with blind subjects are presented in Table 2.

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Insert Table 2 about here

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Scoring procedures. A three-point system devised by Kohlberg (1968) was used to score three measures of moral judgment: lying, justice, and clumsiness and stealing. The scale included the following intervals:

1. Fail: no response or a bizarre or irrelevant one
2. Response focuses on consequences of an act
3. Response focuses on intentions, rather than consequences of an act

TABLE 2

Descriptions of the Moral Judgment Tasks

Subtest	Abbreviation	Original Task	Adaptation for Present Study
1. Lying	Lying Story #1 Lying Story #2 Lying Story #3 (Numbers indicate pairs of stories)	After the subject was provided a definition of the term "lie," he was read a series of paired stories, each accompanied by a pertinent drawing. Then he decided which of the two fabrications told him was the more serious.	The subject was given a braille copy of the story to replace the drawing. The examiner read the story aloud while the subject read silently.
2. Justice (a) Justice-Retributive or Reciprocal	Justice #3 Justice #4 (Numbers indicate stories used in analyses)	Stories of a misdeed followed by three possible modes of punishment were read to the subject. After each story the subject then was asked to choose the fairest punishment, the harshest punishment, the one he himself would choose, and the one his parents might use. Pertinent drawings accompanied the stories.	Braille copies of each story enabled the subject to follow as the examiner read the story. In answering the questions, the subject was encouraged to refer to the story.
(b) Collective Responsibility	Collective Responsibility #1 Collective Responsibility #2 Collective Responsibility #3 (Numbers indicate stories used in analyses)	Stories were read to the subject which required him to make judgments concerning the justice of punishing an entire group for something one member had done. In some instances, identity of the wrongdoer was unknown. Pertinent drawings accompanied the stories.	Braille copies of each story enabled the subject to follow as the examiner read the story. In answering the questions, the subject was encouraged to refer to the story.

TABLE 2 - Continued

Subtest	Abbreviation	Original Task	Adaptation for Present Study
3. Clumsiness and Stealing (Intent vs. Consequence)	Clumsiness #1 Clumsiness #2 Clumsiness #3 Clumsiness #4 Clumsiness #5 (Numbers indicate pairs of stories used in analyses)	To determine if seriousness of a deed was judged in terms of intent of doer or consequences of the act, paired stories were read which required a decision concerning the gravity of an act. Pertinent drawings accompanied the stories.	Braille copies of each story enabled the subject to follow as the examiner read the story. In answering the questions, the subject was encouraged to refer to the story.
4. Rules of the Game	Has Rules Changes Rules	Subject and examiner engaged in abbreviated game of bowling. Two scores were obtained, one on the subject's ability to verbalize a rule, the other on his ability to observe this rule during play. Several questions probed the child's conception of the origin, divinity, and heteronomy of rules.	No adaptation made.

The following four-point scale was devised to measure moral judgment which involved collective responsibility.

1. Punish everyone
2. Punish no one, with no reason given
3. Punish only the guilty ones, but with no clear reason given
4. Punish only the guilty ones, with a clear reason given

Rules of the Game was scored on two three-point scales. The first scale, which was based on knowledge of rules, contained the following intervals:

1. No knowledge of rules
2. Verbalizes rules, but does not follow them
3. Verbalizes and follows rules

The second section of Rules of the Game dealt with opinions concerning possible alteration of rules, and contained the following intervals:

1. Cannot change rules
2. Changes rules without reservation
3. Changes for mutual benefit

Moral Conduct Variables

Subjects were observed in structured situations which were designed to elicit acts of moral conduct. These situations (with accompanying abbreviations) are listed in Table 3 with a brief description of the original tasks, and any adaptations required for their use with blind subjects.

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Insert Table 3 about here

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Because observed behavior in situations devised to measure moral conduct was either honest or dishonest, only dichotomous (pass-fail) scores were assigned to performance on these tasks. Scoring was carried out immediately after the subject had been observed in the structured situation which evoked the moral act.

Reliability of Reasoning, Psycho-Educational, Moral Judgment, and Moral Conduct Measures

Inter-rater reliability on measures of reasoning was established by generating correlations among scores obtained from three judges,

TABLE 3

Descriptions of the Moral Conduct Tasks

Subtest	Abbreviation	Original Task	Adaptation for Present Study
1. Self-Control	Self-Control	Did the subject take cigarettes or candy from a dish during a time when the examiner was out of the room? (Note cigarettes included for subjects CA 18 +; omitted for subjects CA 6-18).	After his/her attention was called to the dish, did the subject take pretzels or candy from it during the absence of the examiner?
2. Honesty a. Record Return	Honesty	When the subject discovered an attractive ball point pen, did he attempt to find the owner or did he pocket it?	As the subject left a testing session, the examiner noted a record on a nearby table and asked the subject if he had forgotten his 45 rpm record? Did the subject acknowledge it was not his?
b. Money Return - 1	Money Return (1)	The examiner unobtrusively slipped an extra dime into those used in an experiment. Did the subject claim the extra dime as his own?	None
c. Money Return - 2	Money Return (2)	In another session the examiner dropped a nickel as he left the testing room. During the time the subject was alone, did he "pick up" the money?	None
d. Envelope Return	Envelope	The subject was given an addressed, sealed, and stamped envelope containing four coins, and was asked to mail it after school. Did the letter arrive with no indication of tampering?	None

TABLE 3 - Continued

Subtest	Abbreviation	Original Task	Adaptation for Present Study
3. Persistence and Truthfulness a. Hour Glass	Hr. Glass (1) Hr. Glass (2) Hr. Glass (3) (Numbers indicate variables used in analyses)	As the examiner prepared to leave the room, he instructed the subject to watch a three-minute sand glass and, when the sand had drained out, to turn it over quickly. During the examiner's absence, the subject was expected to make five turns (15 minutes). Scores were obtained on persistence, truthfulness, and acknowledgement of delayed flipping.	Water which dripped from a large funnel-type bottle went into a small cup placed beneath it. The subject was instructed to monitor the small cup and when the water reached a specified level (indicated by marking on cup) the subject was to empty the water from the cup into a beaker. (Five cups should have been emptied over a ten-minute period). Scores were obtained on persistence, truthfulness, and acknowledgment of delayed emptying.
b. Desire for Favorable Report - Cheating	Cheat (1) Cheat (2) Cheat (3) Cheat (4) Cheat (5) (Numbers indicate variables used in analyses.)	Blank cards, a rubber stamp, and an ink pad were provided the subject as the examiner explained there was interest in seeing who could stamp the most cards in five minutes. Each card was to be stamped on all four corners of both sides; in addition the rubber stamp was to be applied to the ink pad prior to each stamping. As the examiner left the room, he instructed the subject to observe the clock and start when the minute hand reached a specified point. Scores were obtained on observance of starting time, correct counting of stamped cards, persistence, accuracy in stamping the four corners, and in inking the rubber stamp before each application.	Blank cards, a stapler, and a braille clock were provided the subject as the examiner explained there was interest in seeing who could staple the most cards in five minutes. Each card was to be stapled on all four corners on both sides; in addition, the card had to be returned to its original upright position. Each subject was shown the braille clock and a check made to ensure the subject's ability to read a five minute span on the clock. The

TABLE 3 - Continued

Subtest	Abbreviation	Original Task	Adaptation for Present Study
3.b. continued			subject was instructed to observe the clock and to start when the minute hand reached a specified point. Scores were obtained on observance of starting time, correct counting of stapled cards, persistence, accuracy in stapling the four corners, and in returning cards to their original upright positions.
c. Report of Mishap-Truthfulness	Mishap	During the time the subject was alone and engaged in the hour glass task, an attractive young lady entered the room, despite orders not to, and got some papers; in getting them she overturned a vase and water spilled over other papers on the desk. As she left, she entreated the subject not to tell anyone she had been in the room. When the examiner returned and asked who ruined the papers, did the subject provide information on the mishap?	None

each of whom was trained in use of Piaget-type assessments (Stephens et al., 1969). The obtained reliability coefficients ranged from .77 to 1.00. In the present study two-judge inter-rater reliability was established for reasoning assessments which were adapted for use with blind subjects. The obtained reliability coefficients for point-scale scores, as set forth in Table A Appendix, are based on fourteen randomly selected subjects and range from .92 to 1.00.

Reliability of the Wechsler Scales for use with the blind is discussed by Tillman (1967a, 1967b), Tillman and Osborne (1969), and Bauman (1973). The Wide Range Achievement Test had no data available for administration to the blind although personal communication with personnel from several schools for the blind indicated it was in use. Therefore, a braille adaptation was devised for use in the present study and test-retest reliability was performed on a sample of 70 subjects from the Overbrook School for the Blind. The obtained coefficients were .70 for arithmetic, .67 for spelling, and .56 for reading (three week test-retest interval).

Inter-rater reliability on measures of moral judgment was established from scores obtained from three judges during the Stephens, et al. (1969) study. The obtained reliability coefficients ranged from .83 to 1.00.

Validity of the reasoning and moral judgment tasks is discussed in Piaget's (1962, 1964) description of these assessments. Face validity is considered sufficient for observed moral conduct.

Collection of Data

Two experimenters trained in Piagetian assessment conducted the testing. On time-consuming assessments which did not require particular expertise to administer they were assisted by staff members. A total of 202 visually handicapped children were screened in order to obtain 75 subjects who met the criteria for inclusion in the study. Subjects were screened through administration of the WISC or WAIS Verbal Scale (IQ) and through scores obtained from Warner's Index of Social Characteristics (Social Status). The randomly selected blind subjects were individually administered the adapted Piagetian battery of reasoning, moral judgment, and moral conduct assessments. Average length of testing session was one hour. Total testing time for all assessments (including the WISC or WAIS Verbal and Wide Range Achievement Test) ranged from 8 to 12 hours.

Initially, sighted subjects were screened for inclusion through administration of the WISC or WAIS and through scores obtained from Warner's Index of Social Characteristics. In the present study only the score for the Verbal Scale of the WISC or WAIS was used to compare sighted and blind subjects. Following the random selection of the sighted (IQ 90-110), they were individually administered a battery of reasoning, moral judgment, and moral conduct tasks by three experimenters trained in Piagetian assessments. Five testing sessions were required. In an effort to prevent the establishment of a response set, two similar experiments (for example, conservation of substance and conservation of weight) were not administered successively. In addition to the above battery, each subject was administered the appropriate level of the Wide Range Achievement Test, an achievement test which measured spelling, reading, and arithmetic ability.

Data Analysis

Attempts to determine relationships which existed among measures of reasoning, moral judgment, and moral conduct and attempts to compare the performance of sighted with that of the blind on these measures resulted in the use of the following statistical techniques:

1. Measures of central tendency and dispersion were obtained on all variables
2. One-way analyses of variance were used to determine if significant differences existed between the performances of the two groups - blind and sighted - on measures of reasoning, moral judgment, and moral conduct, and to determine if differences existed among the three age groups of blind and sighted
3. Analyses of covariance were computed to determine the effects of chronological and mental ages in the three areas
4. Significant differences between blind and sighted on specific moral conduct tasks were determined by chi-square techniques
5. Correlational techniques determined the degree of relationships which existed among measures of reasoning, measures of moral judgment, and measures of moral conduct
6. Factor analysis was employed to analyze the structure of the relationships among reasoning variables
7. Coefficient of congruence techniques were used to compare the factor structure of scores for blind and for sighted subjects on reasoning and psychoeducational measures.

CHAPTER III - RESULTS

To facilitate discussion, results of data analysis are presented under four headings: (a) Reasoning, (b) Moral Judgment, (c) Moral Conduct, and (d) Relationships among measures of reasoning, among measures of moral judgment, and among measures of moral conduct. Tables which set forth the results of these analyses are placed at the back of the report.

Reasoning

The development of reasoning in blind and sighted subjects has been analyzed and compared. Data obtained on the 26 reasoning tasks and selected psycho-educational measures are presented under five headings:

1. Analyses of blind subjects' reasoning scores
2. Analyses of sighted subjects' reasoning scores
3. Comparisons of blind and sighted subjects' reasoning scores
4. Relationships among scores on reasoning measures for blind and sighted subjects
5. Relationships among scores on reasoning measures and psycho-educational measures

Analyses of Blind Subjects' Reasoning Scores

Differences among the three age groups of blind subjects. Analysis of variance techniques were used to determine if significant differences existed among the three age groups of blind subjects (CA 6-10; 10-14; 14-18) on measures of reasoning. Results of these analyses are presented in Table 4.

When performance of the 6-10 group was compared with that of the 10-14 group, significant differences were found to occur on only 8 of the 26 variables. Although the One-to-One Relationship, Term-to-Term Correspondence, Class Inclusion, and Intersection of Classes tasks are considered to represent abilities basic to arithmetical performance and generally are achieved during the initiation of concrete operations, blind subjects in the 6-10 age range did not exhibit optimum performance; instead there was significant development in these basic areas during the years 10-14.

Comparison of the performance of the 10-14 age group of blind subjects with that of the 14-18 age group also resulted in significant differences on eight variables. In these instances significant improvement was noted on conservation tasks which involved conservation of substance and weight (but not volume) and on tasks involving hierarchical classification, all measures of concrete level thought. Significant improvement did not occur for the 14-18 age group on four measures of formal thought.

To determine if significant improvement does occur when the developmental span is increased to twelve years, performance of blind subjects in the 6-10 age group was compared with that of subjects in the 14-18 age group. With this increase in years, significant gains in understanding occurred on 17 of the 26 variables. Again scores on four measures of formal thought reflected little improvement, i.e., scores of the older group indicated a continuing inability to engage in formal or abstract thought. Of interest also was the lack of significant improvement on three measures involving spatial orientation and mental imagery: Rotation of Beads, Rotation of Squares, and Changing Perspectives (stationary). Also significant gains in understanding did not occur on a task which involved conservation of weight; in this instance questions were presented which sought to determine the weight or weightlessness of sugar after it was dissolved in water. These findings indicate that no significant improvement in the ability of blind subjects to perform these seven tasks occurred during the twelve year span, 6 to 18.

Analyses of Sighted Subjects' Reasoning Scores

Differences among the three age groups of sighted subjects. Comparisons of performance for sighted subjects over three age groups (CA 6-10; 10-14; 14-18) were accomplished by analysis of variance techniques. Results are presented in Table 5. Unlike findings from blind subjects, comparisons of CA 6-10 group with CA 10-14 group revealed that the older group performed significantly better on 19 of the 26 variables. Of the variables on which differences between the groups were non-significant, five involved formal thought, a cognitive level unachieved by either of these younger age groups. On the remaining two variables, near optimum performance of the CA 6-10 group precluded later significant improvement.

Comparisons of the CA 10-14 group with the CA 14-18 group yielded significant differences, with the older group demonstrating the superior performance, on only 9 of the 26 variables; these nine included five measures of formal thought, two measure of spatial orientation and mental imagery, and two involving conservation of substance. Near optimum performance was noted for the CA 10-14 group on 16 measures. On one measure of formal thought neither group demonstrated insightful performance. Also, on one task, Rod Sections, performance of the CA 10-14 subjects was significantly superior to that of the 14-18 age group.

When the CA 6-10 group of normals was compared with the CA 14-18 group, the older group's performance was significantly superior on 23 of the 26 variables. On a hierarchical classification task, which involved thought at the formal level, the older group's performance was not significantly different from the unsuccessful performance of the younger group. The remaining variable, on which differences were not significant, was a measure of beginning classificatory ability; scores for both groups reflected optimum performance on this measure. These findings suggest that significant development in cognitive structure occurred in sighted subjects between the ages of 6 and 18 years.

Comparisons of Blind and Sighted Subjects' Reasoning Scores

Descriptive statistics. These were employed in order to permit the organization of data in a form that made possible quantitative statements concerning the level of magnitude attained for the scores on each of the variables included in the study, and in order to determine the extent to which scores for one variable differed in magnitude and in distribution from scores for other variables. Descriptive statistics for scores on the psycho-educational variables for blind and sighted subjects are set forth in Table 6; scaled scores were used for the sub-tests of the Wechsler Intelligence Scales and of the Wide Range Achievement Test (WRAT). Scores for chronological age (CA) and mental age (MA) are based on months. **Scores on the Index of Social Characteristics (ISC) decrease in magnitude as increases occur in social status; the score range is set forth in Table B Appendix.**

Scores for the total group of sighted subjects (N=75) on psycho-educational measures were compared with scores for the total group of blind subjects (N=75) through use of analysis of variance techniques. Findings, which include means and standard deviations for these variables, are presented in Table 7.

Mean IQ (Verbal Scale) for sighted subjects (N=75) was 98.81 and 100.64 for blind subjects (N=75). Scores for each of the two groups differed significantly on four of the Wechsler variables. The blind had superior performance on three of these: Arithmetic, Similarities, and Digit Span. However, it was the sighted subjects who exhibited superior performance on Wechsler vocabulary; the sighted subjects also had superior scores on WRAT Arithmetic and WRAT Reading. These differences occurred despite the fact that the two groups were equated on both age and IQ (range 90-110).

Statistically, significant differences between the two groups also occurred on the ISC. The average rating for the sighted group was lower middle class, for the blind group it was upper lower class.

Differences between blind and sighted subjects. Analysis of variance techniques were used to test for significant differences in reasoning scores between the two groups of subjects, blind (N=75) and sighted (N=75); results are set forth in Table 8. Significant differences were found on 18 of the 26 variables; in each instance the sighted subjects had superior performance. On three measures of conservation of substance and on four measures of classificatory thought the performance of blind subjects approximated that of sighted. Means for neither the blind nor the sighted approached the maximum score on the remaining variable, a measure of abstract thought.

Differences between the three age groups of blind and sighted subjects also were determined by analysis of variance techniques, and the results are presented in Table 9. Comparisons of the two groups (blind and sighted) at the three age levels reveal significant differences at each age level. The two (blind and sighted) 6-10 age groups differed significantly on 14 of the 26 reasoning variables; the 10-14 age groups differed significantly on 21; and the 14-18 age groups on 17 of the 26 variables. In each instance, scores for the sighted subjects exceeded those of the blind except for scores obtained on a task of hierarchical classification. The superior performance of blind subjects on this task may be attributed to the fact that adaptation of the measure for blind subjects (hierarchical classification of real food) proved to be a more elementary task than the original version (hierarchical classification of pictured animals) which was administered to the sighted subjects. Previous work by Kohlberg (1963) serves to indicate that classification of foods emerges before that of animals. Also, as previously noted, the blind were presented actual food while the sighted were presented pictorial representations of animals. On variables for which performance of the two groups did not differ significantly, two conditions were noted, either the tasks measured initial stages of concrete thought which had been achieved by both groups, or the tasks required advanced formal or abstract thought, a level generally unachieved by both groups. Taken collectively these data serve to suggest that sighted subjects, equivalent in age and IQ to blind subjects, tend to display superior cognitive functioning.

To examine further the differences between the blind and sighted groups, scores for the blind CA 10-14 group were compared with those for the sighted CA 6-10 group. Following this, scores for the blind CA 14-18 group were compared with the sighted CA 6-10 group and with the sighted CA 10-14 group. Obtained differences are set forth in Table 10. Even with a four-year advance in chronological age, the blind CA 10-14 group performed significantly better than the sighted CA 6-10 group on only 4 of the 26 variables; these involved the previously discussed hierarchical classification task (the adapted version for blind subjects probably was not as difficult as the original task, i.e., the one used with sighted subjects). On four variables--tasks involving conservation of weight, conservation of volume, class inclusion, and three dimensional (length, width, and height) thought--the performance of the CA 6-10 sighted group exceeded that of the CA 10-14 blind group.

When the blind CA 14-18 age group was compared with the CA 10-14 sighted group, significant differences were noted on 15 of the 26 variables. On only two of those did the older blind group have superior performance, and again this performance was on the previously discussed task of hierarchical classification. On the other 13 variables the performance of the CA 10-14 sighted group exceeded that of the CA 14-18 blind group.

Additional assessment of the two groups was provided through comparison of the performance of the CA 14-18 blind group and the

CA 6-10 sighted group. On 19 of the 26 variables there were no significant differences. The CA 6-10 sighted group performed significantly better than the CA 14-18 blind group on a conservation of volume task (although neither group approached optimum performance). On the remaining six variables the older blind group's performance was significantly superior, but three of these six involved the previously discussed hierarchical classification task. Excluding these the CA 14-18 blind group's performance excelled that of the CA 6-10 sighted on three conservation measures (substance and length) only. These data serve to suggest an overall lag of at least eight years in the development of reasoning in the blind subjects, and an even greater lag is indicated for the Conservation of Volume task. On this task, performance of the CA 6-10 sighted surpassed that of the CA 14-18 blind subjects.

When performance of the three age groups of blind subjects was compared, growth in cognitive functioning over time was indicated. However, when compared with sighted subjects of equivalent age and IQ, significantly superior performance was noted for the sighted. These data confirm results attained by other researchers which document deficits in the functioning of blind children. The striking finding, though, of equivalent performance of CA 14-18 blind with CA 6-10 sighted subjects on 19 of the 26 reasoning variables, had been unanticipated. These results do suggest that there is a SEVERE DEFICIT in the cognitive functioning of the blind child, and they serve to emphasize the need to develop intervention programs which are designed to promote cognitive functioning in blind children. A second implication derived from the present study is: Now that there are data which indicate congenitally blind children exhibit severe deficits in reasoning, additional research should be conducted to determine if partially sighted or children blinded later in life experience similar inadequacies.

The effects of mental and chronological age on performance. To determine the effects of chronological age, of mental age, and of the combined effects of both on the 26 reasoning variables, analyses of covariance were computed with (a) chronological age held constant, (b) mental age held constant, and (c) both mental and chronological age held constant. Results of these comparisons are presented in Tables 11, 12, and 13 respectively. When chronological age was held constant, the performance of sighted subjects was significantly superior to that of the blind subjects on 21 of the 26 variables. Blind subjects had significantly superior performance on one subscore for a hierarchical classification task. Near equivalent performance for the two groups occurred on a conservation of substance task, a conservation of length task, and on the three remaining subscores for the hierarchical classification task.

When mental age was held constant, performance of the sighted group was significantly greater than that of the blind group on 23 of the 26 reasoning variables. The blind group again had superior performances on three subscores for the hierarchical classification task, but again on only one of these were the differences statistically superior.

The results of controlling for both chronological and mental age are set forth in Table 13. Again, performance of the sighted was significantly superior on 21 of the 26 variables; on one subtest of the hierarchical classification task, the blind group had significantly greater scores. On the remaining four variables, three of which represented hierarchical classification subscores and one conservation of length score, the sighted and blind groups did not differ significantly. These results indicate that marked differences in reasoning exist between the sighted and blind subjects, with the sighted exhibiting the superior performance. That these differences remain even when mental and chronological age are controlled may be expected since the two samples, blind and sighted, were equated on both.

Although chronological age and intelligence have shown some relationship to cognitive functioning (Almy, et al., 1966; Brekke, Williams, & Tait, in press; Hatwell, 1966; Lovell & Ogilvie, 1960; Miller, 1969; Stephens, 1969, 1972; Woodward, 1961), the present results serve to indicate that the differences between the blind and sighted subjects cannot be explained on the basis of chronological age or mental age. Therefore, it may be concluded that significant differences exist between the blind subjects and the sighted subjects which are not attributable to CA or MA; however, it may be inferred that experiential difference between the two groups; i.e., the sensory deprivation experienced by the blind subjects has contributed to these differences.

Relationships among Scores on Reasoning Measures for Blind and Sighted Subjects

Intercorrelations were computed for reasoning point scale scores for blind subjects (N=75) and for sighted subjects (N=75). The obtained correlations are set forth in Table 14.

Relationships among Scores on Reasoning Measures and Psycho-Educational Measures for Blind and Sighted Subjects

Correlational techniques were used to determine the relationships among reasoning measures, chronological age, mental age, and Wechsler subscores. The obtained correlation from scores for blind subjects (N=75) are set forth in Table 15. Correlations obtained from scores for sighted subjects on the same variables are set forth in Table 16.

Moral Judgment

Data was obtained on moral judgment in order to determine (a) if the development of moral judgment in blind persons was approximate to the development in sighted persons, and (b) if relationships existed among the various verbalized areas of moral judgments. The same moral judgment assessments were administered to sighted subjects during the Stephens, et al., (1969) study. These scores made possible the comparison of sighted subjects' and blind subjects' performance on measures of moral judgment. Through this it was possible to determine what similarities, if any, existed in the response tendencies of the two groups. Analysis of the performance of various age groups of blind and sighted subjects served to denote developmental trends. Determination of the relationships which existed among the various moral judgment measures provided information on general abilities or traits basic to functioning in this area.

Findings derived from analyses of measures of moral judgment are presented in the following sequence:

1. Analyses for blind subjects' moral judgment scores
2. Analyses for sighted subjects' moral judgment scores
3. Comparisons of blind and sighted subjects' moral judgment scores
4. Relationships among measures of moral judgment for blind and sighted

Analyses for Blind Subjects' Moral Judgment Scores

Comparisons of the three age groups of blind subjects. Analysis of variance techniques were utilized to determine differences between the three age groups of blind subjects (CA 6-10; 10-14; 14-18) on measures of moral judgment. Results of the comparisons between these groups are presented in Table 17. The CA 10-14 group of blind subjects had significantly higher scores than CA 6-10 subjects on three measures of moral judgment. When performance of the CA 10-14 group was compared with that of the CA 14-18 group, the older group had significantly superior scores on six tasks. In contrast to this the CA 10-14 group's performance was significantly superior to that of the older, CA 14-18 group on one measure, Lying Story #2. Finally, performance of the youngest blind subjects, CA 6-10, was compared with that for the oldest, CA 14-18, blind subjects; this comparison yielded significant differences on seven variables (with the older group obtaining the higher mean in each instance). These data serve to suggest that moral development as measured in the present project is developmental in blind subjects CA 6-18, IQ 90-110, with the exception of five variables: Justice #3, Clumsiness #1, Clumsiness #4, Collective Responsibility #1, and Collective Responsibility #2. On these five there was no significant change in scores for subjects between the ages of 6 to 18. On one additional measure, Lying Story #2, significant development occurred between the years 6 through 14, but in the ensuing years, 14 to 18, a significant decrease in performance occurred.

Analyses for Sighted Subjects' Moral Judgment Scores

Comparisons of the three age groups of sighted subjects. Results of comparisons by analysis of variance techniques between different chronological age groups for sighted subjects are presented in Table 18. Sighted subjects CA 10-14 showed significantly better performance than the CA 6-10 subjects on 6 of the 15 tasks. When compared with the CA 14-18 sighted group, the CA 10-14 performance was equivalent on all but five of the tasks. On one, Justice #4, performance of the middle group surpassed that of the older, CA 14-18 group; on the remaining four the performance of the older group was significantly superior to that of the middle group. When performance of the older group, CA 14-18, was compared with that for the younger group, CA 6-10, scores for the older group were significantly greater on 8 of the 15 variables.

A review of scores across age groups indicated significant differences (indicative of development) occurred among the three sighted groups on all but four of the moral judgment variables. Near maximum scores for the CA 6-10 age group precluded significant increase in scores on Lying Story #1 and Clumsiness #4; although not significant, a decrease in scores for the older, CA 14-18 group, was noted for Justice #3 and Collective Responsibility #1.

Comparisons of Blind and Sighted Subjects on Measures of Moral Judgment

Descriptive Statistics. Means and standard deviations for each measure of moral judment are presented within the analyses of variance tables. These statistics were determined from point scale scores.

Differences between blind and sighted subjects. To determine if the two groups, blind and sighted, had significantly different performance on measures of moral judgment, these data for the two groups were subjected to analysis of variance techniques.

Differences between the total groups of sighted (N=75) and blind (N=75) subjects are presented in Table 19. Significant differences occurred on five variables: Lying Story #2 and # 3, Justice #3, Collective Responsibility #1, and Has Rules; in each instance the sighted group had the higher mean.

When scores for each of the three age groups of sighted subjects were compared with scores for each of the three age groups of blind subjects, differences in developmental trends were noted. Results of comparison of the two CA 6-10 groups, blind and sighted, are set forth in Table 20. Significant differences occurred on three variables; on each of these the blind group had the higher mean. When the blind group CA 10-14 was compared with the sighted group of the same age range, significant differences occurred on four variables (Table 20); in each of these instances the sighted had the higher mean. (None of these were variables on which the blind CA 6-10 group had exhibited superior performance). When scores for the two older groups, blind and sighted CA 14-18, were compared (Table 20), the sighted had higher scores on the five measures on which there were significant differences.

To determine the extent of the discrepancies among scores for blind and sighted, across groups, comparisons were made for various age groups. Significant differences occurred between blind subjects CA 10-14 and sighted subjects CA 6-10, on only two variables. These are presented in Table 21; on one, Collective Responsibility #1, the CA 6-10 sighted had the higher mean; on the other, Collective Responsibility #2, the CA 10-14 blind group had the higher mean.

Comparison of scores for blind subjects CA 14-18 with sighted subjects CA 6-10 (Table 21) revealed significant differences on seven variables, in each instance the older blind group exhibited superior performance. When scores for the older blind group, CA 14-18, were compared with scores for the middle group, CA 10-14 sighted subjects, significant differences were revealed on seven variables (Table 21); on four variables the older blind group had superior performance, but the CA 10-14 sighted subjects had higher means on three variables: Lying Story #2, Justice #3, and Justice #4.

Generally results of comparison of performance of the two groups, blind and sighted, on moral judgment measures do not indicate deficits in the development of moral judgment in blind subjects as major as those which emerged when the two groups were compared on measures of reasoning. However, in instances where significant deficits were revealed, the sighted generally had the higher means.

Interest was not only in differences between groups, however, but also in the development of moral judgment in both blind and sighted subjects. Therefore, when data obtained for the three age groups of blind subjects were subjected to analyses of variance, and when similar analyses were carried out on data for the three age groups of sighted subjects, there was indication of the developmental trends in moral judgment that had been noted previously by Kohlberg (1968); i.e., performance of the middle age group (CA 10-14) generally was superior to that of the younger group (CA 6-10) and in turn, the performance of the older group (CA 14-18) generally was superior to the middle one (CA 10-14). Superiority, however, was not always statistically significant.

The effect of mental and chronological age on scores for measures of moral judgment. To determine the effect of mental age on performance on moral judgment measures, techniques of analysis of covariance were employed with mental age as the covariate. The results presented in Table 22, indicate that with mental age held constant the two groups, blind and sighted, differed significantly on six measures; in each instance the sighted had higher means. Additional analyses of covariance were computed with both mental and chronological age held constant; results are presented in Table 23. Mean scores for the sighted group were statistically greater on the same six variables. The finding was not unexpected since the IQ range for both groups was 90-110; each group had approximately the same mental and chronological age. Major interest resulted from the fact that the sighted group had statistically superior scores on 6 of the 15 measures of moral judgment, whereas their performance had been significantly superior to that of the blind group on 22 of the 26 reasoning variables. These findings suggest that sensory deprivation does not penalize the development of moral judgment to the extent that it penalizes the development of logical reasoning.

Relationships among Scores on Moral Judgment Measures for Blind and Sighted Subjects

The purpose of this particular analysis was to determine the degree of intercorrelation within and between responses to questions designed to represent different areas of moral judgment (Table 24). Review of the intercorrelation matrices for blind and sighted subjects reveals either moderate or low relationships. The scores for sighted subjects produced 26 significant correlations, while the scores for blind subjects produced 32 significant correlations out of the total 105. These findings served to suggest that the blind experienced a slightly greater degree of generalization in moral judgment than did the sighted subjects.

Moral Conduct

As previously noted, studies of character development by Hartshorne and May (1929) have remained landmarks in research on moral conduct, primarily because of their skillful adaptation of measurement procedures to research objectives. For example, subjects were placed in temptation situations to assess their ability to resist temptation. These early findings suggested that moral conduct was determined by the situation and was not necessarily generalizable. Subsequent studies on morality tended to center attention either on these generality versus specificity issues or to attempt to establish the influence of such variables as ego function, interpersonal patterns, or social climate on conduct. Until the Stephens, et al. (1969) and the Stephens (1972) studies there had been neglect in the use of measurement procedures similar to those devised by Hartshorne and May to analyze (either cross-sectionally or longitudinally) the development of moral conduct. When such procedures were used in the Stephens' studies, the results obtained strongly suggested that moral conduct was developmental in nature.

Because of interest in specific measures of moral conduct, data or observed behavior are presented under the following headings:

1. Analyses for blind subjects' moral conduct scores
2. Analyses for sighted subjects' moral conduct scores
3. Comparisons of sighted and blind subjects on measures of moral conduct
4. Relationships among scores on moral conduct tasks for sighted and blind subjects

Analyses for Blind Subjects' Moral Conduct Scores

Descriptive data derived from scores on moral conduct tasks. From the nine moral conduct tasks designed to measure self-control, truthfulness, persistence, and honesty, fourteen dichotomous scores were obtained for each subject. Means and standard deviations on measures of moral conduct were calculated for the total population of blind (N=75) subjects. Results are presented in Table 25. When compared with the sighted norms, blind subjects produced higher mean scores on four of the fourteen moral conduct tasks; honesty (record return), money return (2), hour glass (2),and envelope return. Percentage of blind subjects failing one or more moral conduct tasks was calculated and is outlined in Table 26. Of the 75 blind subjects, 72 (96%) failed one or more moral conduct tasks. Tabulation of total number of moral conduct tasks failed by blind subjects is set forth in Table 27; also the number of moral conduct failures on each moral conduct task was summarized. In addition, failures on measures of moral conduct were tabulated for each of the three age groups of blind subjects. In general, a decrease in misconduct as subjects increased with age again was seen; i.e., younger subjects engaged in substantially more moral conduct violations than did the older groups. The tasks which produced the greatest number of misconduct scores over the three age groups of blind subjects were: Mishap, Cheat #1, Cheat #4, Cheat #5, and Hour Glass #1. Finally, the frequency distribution of moral conduct failures within each age group and for the total blind population is presented in Table 28. The frequency distribution of moral conduct failures for the blind population (N=75) possesses a near normal shape with a mode of three violations.

As a reminder of the lack of perfection that generally exists in humans it was noted that of the total 150 subjects, 131 failed one or more moral conduct tasks. Of this number, 72 were represented by congenitally blind subjects. The greatest misconduct scores for the blind group resulted from failure to be accurate, and failure to follow directions (Cheat #4 and Cheat #5), a failure which may have resulted in part from lack of understanding rather than willful nonobservance of rules. In fact, the entire cheating task proved to be a less than optimum adaptation for the blind subjects. The original task had required sighted subjects to stamp each corner of a 3 x 5 card, front and back, with a rubber ink stamp. The subject was told it was a test of speed and he was to see how many cards could be stamped in a five-minute period. He then was left alone and observed through a one-way mirror. In the adapted version blind subjects were given similar instructions, but were required to staple each corner of a 3 x 5 card, front and back. The task proved difficult for some subjects because of their unfamiliarity with a stapler and/or fear of hurting themselves while using it (although each subject had a trial run through the entire procedure before the assessment began). Failures on Cheat #4, accuracy, and Cheat #5, ability to follow directions, accounted for the majority of violations among blind subjects.

Comparison of three age groups of blind subjects on measures of moral conduct. Analysis of variance techniques were employed to test the differences between the three age groups of blind subjects on measures of moral conduct. Predicated on Cochran's and Cox's (1957) discussion of the statistical handling of binary data, the F-ratio was used to test significance of differences among the blind subjects. Each age group (CA 6-10; 10-14; 14-18) was compared with each other age group. Results are presented in Table 29. Blind subjects CA 6-10 produced significantly lower scores than blind subjects CA 10-14 on one moral conduct task and statistically equivalent scores to blind subjects CA 14-18 on all moral conduct tasks. Differences between blind subjects CA 10-14 and blind subjects CA 14-18 were not statistically significant on any of the 14 measures.

Analyses for Sighted Subjects' Moral Conduct and Scores

Descriptive data derived from scores on moral conduct tasks. The fourteen dichotomous scores obtained from sighted subjects' performance on nine moral conduct measures of self-control, truthfulness, persistence, and honesty were examined in the same manner as were scores for the blind subjects. Means and standard deviations were calculated and are summarized in Table 25. Percentage of sighted subjects failing one or more of the moral conduct tasks was calculated and is outlined in Table 26. Of the 75 sighted subjects, 59 engaged in one or more moral conduct trespasses (78.66%). Table 27 contains the total number of moral conduct tasks failed by sighted subjects in each of the three age groups. Frequency of moral conduct failures on each task by sighted subjects (N=75) also was calculated. The breakdown of these frequencies of moral conduct failures for each task is presented in Table 27. Like performance of the blind subjects, a general decrease in misconduct with increase in age was noted. For sighted subjects, the greatest number of misconduct scores over all three age groups involved the ability to follow directions (Cheat #5), with 35 violations; truthfulness as measured in Cheat #4, was second with 20; honesty ranked third with 19. The frequency distribution of moral conduct failures for sighted subjects within each age group and for the total group is presented in Table 28. Examination of the table suggests the frequency distribution is positively skewed with a mode at zero violations for the total sighted sample (N=75).

Comparison of three age groups of sighted subjects on measures of moral conduct. Analysis of variance techniques were employed to test differences among the three age groups of subjects on measures of moral conduct. As noted previously, the F-ratio was used to test the significance of differences between these age groups (Cochran and Cox, 1957). For analyses where this technique was inappropriate as a result of no variance within one group, the Mann-Whitney U-Test was substituted. Each age group (CA 6-10; 10-14; 14-18) was compared with each of the other age groups. Results are presented in

Table 30. Sighted subjects in the CA 6-10 group produced significantly lower scores than the CA 10-14 group of sighted subjects on two moral conduct tasks. On one task, Envelope, the CA 6-10 group significantly surpassed the performances of the CA 10-14 group. The CA 10-14 group of subjects also produced significantly lower scores than CA 14-18 subjects on two moral conduct tasks. When the CA 6-10 group was compared with the CA 14-18 group, six moral conduct tasks produced significantly lower scores for the CA 6-10 group.

Comparisons of Blind and Sighted Subjects on Measures of Moral Conduct

Descriptive data derived from scores on moral conduct tasks. Review of the percentages of blind and sighted subjects who failed one or more moral conduct tasks (Table 26) serves to suggest that misconduct decreases with advance in age for the sighted subjects. When the total number of moral conduct failures for blind and sighted subjects were compared on each of the moral conduct variables, the blind subjects (N=75) produced a significantly higher number of moral conduct failures than sighted subjects. A summary of the number of moral conduct failures on each moral conduct variable for blind and for sighted subjects and a chi-square test of independence for each variable is presented in Table 31. Blind subjects produced significantly more failures than sighted subjects on five moral conduct tasks and significantly lower failure frequencies on two tasks. When sighted and blind subjects were compared on each of the three age ranges (Table 27), blind subjects consistently maintained higher misconduct scores. Greatest differences in scores between sighted and blind subjects occurred in the CA 14-18 group. These findings serve to suggest that although moral conduct appears to be developmental in both groups, the sighted adolescents are developmentally more advanced than their blind peers.

Differences between the three age groups of blind and sighted subjects on measures of moral conduct. Scores for blind and sighted subjects within the same age range were compared by analysis of variance and Mann-Whitney U techniques; results are set forth in Table 32. Blind subjects CA 6-10 had a significantly lower conduct score than sighted subjects on one moral conduct task and significantly higher scores on two tasks. Blind subjects CA 10-14 had significantly lower scores than sighted subjects of the same age group on three moral conduct tasks and higher scores on one task. Likewise the CA 14-18 group of blind subjects had significantly lower performance than the comparable age group of sighted subjects on three tasks. In each of the three age groups, CA 6-10, 10-14, and 14-18, scores for the blind subjects were significantly lower than those for sighted subjects in a situation which involved accuracy in a work assignment; previously noted reasons for the difficulty include blind students' lack of experience with a braille clock and with a stapler.

Following the above analyses, younger age groups of sighted subjects were compared with older age groups of blind subjects; results are set forth in Table 33. When compared with scores for sighted subjects CA 6-10, the scores for blind subjects CA 10-14 were significantly lower on one variable, Cheat #4, but significantly higher on three variables. When scores for blind subjects CA 14-18 were compared with scores for sighted subjects CA 6-10, significant differences occurred on four variables; only Cheat #4 favored the younger sighted children. Comparison of blind subjects CA 14-18 with sighted ones CA 10-14 indicated significantly superior performance for the sighted on two variables.

As a summary analysis, moral conduct scores for the total group of blind subjects (N=75) were compared, through analysis of variance and Mann-Whitney U techniques, with moral conduct scores for the total group of sighted subjects (N=75). Results are set forth in Table 25. Means for the two groups were significantly different on 7 of the 14 variables. On only two of these variables, Honesty and Money Return #2, was performance of the blind subjects significantly in advance of sighted subjects. One superiority could be attributed to blind children's desire to please others and to be accepted. Money Return #2 produced similar results, i.e., none of the blind students took the nickel that was dropped near him . It was suggested that this phenonmenon could be related to the "disappearing past" experienced by the blind, i.e., once the sound of the falling object was extinguished, the temptation stimulus was so reduced that it had no lasting effect on the child. In contrast, sighted subjects were confronted with a continuing visual stimulus which provided constant temptation.

The effect of mental and chronological age on scores for measures of moral conduct performance. Analysis of covariance techniques were used in order to determine the effect of mental age on moral conduct performance. The results are summarized in Table 34. With mental age held constant, blind subjects produced significantly lower adjusted mean scores than sighted subjects on five moral conduct tasks and significantly higher adjusted mean scores on two.

Analysis of covariance techniques also were utilized to determine the influence of both mental and chronological age upon moral conduct performance (Table 35). Blind subjects again produced significantly lower adjusted mean scores than the sighted subjects on the same five moral conduct tasks and significantly higher adjusted mean scores on the same two tasks.

Relationships among Scores on Moral Conduct Measures for Blind and Sighted Subjects

Correlational techniques were used to assess the relationships which existed among dichotomous scores for sighted and blind subjects on moral conduct variables (Table 36). Of the 91 intercorrelations obtained, fifteen attained significance for blind subjects and fourteen were significant for the sighted subjects.

Factor Structure of Reasoning and Psycho-Educational Measures

Factor analytic techniques were employed to determine whether the numerous reasoning and psycho-educational variables could be reduced to a smaller number of common factors, thereby determining the basic dimensions or relationships among these variables. The fact that there are 75 sighted and 75 congenitally blind subjects in a study involving 38 variables is acknowledged. The ten-to-one ratio between subjects and variables considered desirable in a factor analytic study (Fruchter, 1954) was not maintained. However, the stability of the obtained factor structure is a function of the number of subjects that determine the original correlation coefficient. Knowing that the standard errors of zero correlation for the sample sizes 75 and 380 are similar (.12 and .05, respectively), decision was made to group the 38 variables in one matrix for exploratory factor analysis.

Two separate factor analyses are reported. The first, which involved point scale scores for the congenitally blind subjects on reasoning and psycho-educational measures, sought to determine the relationships between the reasoning variables and standard measures of intelligence and achievement. The second analysis sought to determine the relationships among scores for the sighted subjects on reasoning and psycho-educational measures.

Factors Derived from Scores for Congenitally Blind Subjects on Reasoning and Psycho-Educational Measures

To establish the relationships which existed among Piagetian measures of reasoning, chronological age, and standard measures of intelligence and school achievement, a factor analysis of the scores on these measures for the congenitally blind sample was accomplished using the Kaiser Varimax orthogonal solution. Seven scores derived from the Wechsler Verbal Scale, three subscores (reading, spelling, and arithmetic) from the Wide Range Achievement Test, one score for chronological age, one for mental age, and 26 scores from Piagetian measures of reasoning were included in the matrix. Ten interpretable factors were extracted. A description of these factors (presented in Table 37) follows:

Factor 1, which represented Piagetian reversability of thought at the concrete and formal level, was defined by major loadings from seven conservation assessments.

Factor 2 had negative loadings from WISC Information, WISC Arithmetic and WRAT Arithmetic, and positive loadings from CA, MA, and a Piagetian task of hierarchical classification.

Factor 3, which was defined by WRAT reading and WRAT spelling subscores appeared to represent ability in language arts.

Factor 4 was suggestive of combinatory logic; it had major loadings from WISC Similarities, and Chemistry.

Factor 5 had major loadings from seven Piagetian assessments which measured basic or initial ability in concrete reasoning; these tasks involved numerical correspondence, hierarchical classification, subcategorization, memory and mental imagery.

Factor 6, also a Piagetian factor, represented the ability to dissociate notions of weight and volume and engage in formal or abstract thought.

Factor 7 was defined by Piagetian measures of spatial relationships, hierarchical classification, and WISC measured comprehension; the structure served to suggest analytical reasoning ability.

Factor 8 had major loadings from Piagetian measures which assessed thought which was transitory between the concrete and formal levels.

Factor 9, with loadings from a WISC measure which assessed the recall of digits and a Piagetian measure of mental imagery which involved changing perspectives was suggestive of skill in grouping objects and numbers in situations involving short term memory.

Factor 10 served to indicate verbal facility because of its two loadings from Wechsler measures of verbal ability, Wechsler Vocabulary and Wechsler Verbal IQ.

Of the 10 factors set forth in Table 37 four are defined solely by Piagetian measures, two exclusively by Wechsler Verbal and Wide Range Achievement Test subscores, and four by combinations of the Wechsler Verbal and Piagetian reasoning measures.

Factors Derived from Scores for Sighted Subjects on Reasoning and Psycho-Educational Measures

A factor analysis of the 38 scores for sighted subjects on Piagetian reasoning measures, chronological age, mental age, and subscores of the Wechsler Scales and the Wide Range Achievement Test was carried out using the Kaiser-Varimax orthogonal solution. The eight interpretable factors, derived from the analysis (Table 38) include:

Factor 1, a Piagetian conservation factor, was defined by loadings from 11 conservation variables, a classificatory variable, a mental imagery variable, and by chronological age. Flexibility and reversability of operational thought processes were the basic abilities represented by the factor.

Factor 2 was primarily a WRAT factor; the three WRAT subscores combined with Wechsler Arithmetic to suggest an academic performance factor.

Factor 3, a Wechsler factor, had three major loadings; Wechsler Comprehension, IQ, and MA.

Factor 4, a factor representative of classificatory and combinatorial logic, had loadings from a Piagetian variable involving hierarchical classification and one involving combinatorial logic at the formal (abstract) level. The major loading for Wechsler Similarities also occurred on this factor.

Factor 5 was defined by loadings from variables representative of thought which was in transition from concrete to formal level. A task which involved simultaneous classification of two criteria also contributed to the strength of the factor.

Factor 6, a verbal factor, contained loadings from WISC Information and WISC Vocabulary.

Factor 7 had major contributions from WISC Digit Span and a Piagetian measure which assessed the ability to anticipate changes in perspective when objects were viewed from different angles.

Factor 8 was characterized by mobility in reformulating mental images which involved spatial relations. Three Piagetian measures of spatial relations and a Piagetian measure of formal thought combined to define the factor.

Of the eight derived factors, three were defined solely by Piagetian variables, three solely by Wechsler and WRAT variables, and two by combination of Piagetian and Wechsler variables. Combinatory logic, as measured by Piagetian assessments and the analogous reasoning involved in Wechsler Similarities, appeared to tap a common basic ability. Likewise, the short term memory involved in Wechsler Digit Span was found to involve an ability basic to skill in the type of mental imagery that was required to determine a priori, how an object would look if viewed from a different perspective. In the matrix these two variables, Wechsler Digit Span and Wechsler Similarities, were the only two psycho-educational measures whose major loadings combined with major loadings from Piagetian measures to define a factor.

Comparison of the Factor Structure for Blind and Sighted Subjects

To determine if the factor structure of abilities in blind subjects on reasoning and psycho-educational measures was comparable to that for sighted subjects, coefficients of congruence were calculated (Rummel, 1970). Data supplied by this method are similar to those obtained from correlational coefficients; i.e., they range from -1.00 to 1.00. However, the coefficient of congruence differs from the correlation technique because the former technique does not equate means. The coefficient of congruence does measure pattern similarity; it also provides an aspect of magnitude similarity. The coefficient of congruence is the cosine of the angles between the factors in the space of $\underline{m}$ orthogonal variables. The congruence matrix for the eight factors obtained from an analysis of sighted subjects' scores and the 10 factors obtained from an analysis of blind subjects' scores is set forth in Table 39.

Review of the matrix. A high degree of congruence existed between Factor 1 for sighted subjects, a conservation factor, and Factor 1 for blind subjects, also a conservation factor. Factor 1 for sighted subjects also had a high degree of congruence (.73) with Factor 5 for blind subjects (a factor representative of initial ability in concrete reasoning) and Factor 7 for blind subjects (a factor suggestive of analytical reasoning). The latter coefficient of congruence was .58.

Factor 2 for the sighted subjects (defined by loadings from three WRAT subtests and from the Wechsler arithmetic subtest) was related in structure to Factor 2 for the blind subjects (also defined by loadings from Wechsler Information and Arithmetic, and WRAT arithmetic). Factor 2 for the sighted had an inverse relationship with Factor 3 for the blind (defined by WRAT Spelling and WRAT Reading subscores).

The highest congruence coefficient for Factor 3 for the sighted (which was described as a Wechsler verbal factor) was with Factor 7 for the blind (a factor suggestive of analytical reasoning). The influence of verbal ability on analytical reasoning in the blind was suggested by these data.

Factor 4 for the sighted (defined by Piagetian measures of hierarchical classification and combinatory logic and by Wechsler similarities) had the highest coefficients of congruence with Factors 5 (basic ability in concrete reasoning) and 7 (higher order analytical reasoning) for blind subjects.

Factor 5 for sighted subjects (which had major loadings from four measures of formal thought) had its highest degree of congruence with Factor 6 for blind subjects (also a factor defined by measures of formal thought).

The highest coefficient of congruence for Factor 6 for sighted subjects (defined by loadings from Wechsler Information and Vocabulary subtests) was with Factor 10 for blind subjects (also defined by Wechsler measures of verbal ability).

The highest coefficient of congruence for Factor 7 for sighted subjects (defined by a Wechsler measure of short term memory and a Piagetian measure of perceptual mobility) was the one with Factor 9 for blind subjects (which had major loadings from the same two variables).

Factor 8 for sighted subjects (defined by Piagetian measures of spatial relations and formal reasoning) had its highest coefficient of congruence with Factor 5 for blind subjects (which also was defined by measure of spatial relations, but which had additional loading from initial ability in concrete reasoning).

Thus the matching of factors from the matrix derived from scores for blind subjects with the matrix derived from scores for sighted subjects, results in expected congruences; i.e., the combination of variables which defined a factor in the matrix for the sighted subjects tended to be the same combination which defined factors in the matrix for blind subjects. However, the ability (or reversability of thought) basic to conservation assessments in sighted subjects related not only to conservation ability but also to initial and to higher order reasoning ability in blind subjects. Also, as previously noted, a Wechsler verbal factor for sighted subjects related to a factor for blind subjects which had loadings from five Piagetian reasoning variables and from the Wechsler comprehension subtest; this congruence coefficient serves to suggest that blind subjects' performance on reasoning tasks involves verbal skills not dissimilar to those exhibited by sighted subjects on subtests of the Wechsler Verbal Scale.

CHAPTER IV - CONCLUSIONS

A point by point summary of findings which issue from the study is followed by consideration of the practical and theoretical significance of these results.

Psycho-Educational Measures

Although the two randomly selected groups, blind and sighted, were equated on age (CA 6-18) and IQ (90-110), blind subjects had statistically higher scores on Wechsler Arithmetic, Similarities, and Digit Span. Superior performance by blind subjects on these sub-tests serves to suggest non-impaired functioning in memory and in reasoning which relies on recorded or "stored" verbal facts. These findings also may be interpreted as indicating that, in areas where the blind subjects were not penalized by the cumulative effects of sensory deprivation, their abilities surpassed those of the sighted. But on Wechsler vocabulary, the sighted subjects scored significantly higher; this finding underscores the problem of "verbalism" (Cutsforth, 1950; Harley, 1963), i.e., the tendency of blind persons to use words in an imprecise manner. Sighted subjects also scored significantly higher on the WRAT Arithmetic and Reading sub-tests, both measures of school achievement, and also on ISC, a measure of social status. Social class level assigned to the sighted group was lower middle while the level for the blind group was borderline upper lower and lower middle. Analyses of scores on psycho-educational measures supply useful background data for review of the two groups' performance on measures of reasoning, moral judgment, and moral conduct.

When blind and sighted subjects were assessed on Wechsler Verbal Scales, on the Wide Range Achievement Test, and on the Index of Social Characteristics, significant differences were noted on seven of the 13 variables. Dissimilar patterns of performance emerged even though the two groups were matched on age and IQ.

Reasoning

1. While tasks involving term-to-term correspondence generally are regarded as representative of reasoning which is transitional between the preoperational and concrete level, success on these tasks was achieved, not by the CA 6-10 group of blind subjects but by the CA 10-14 group. Other concrete level conservation tasks which generally are achieved by normal elementary school pupils were achieved only by the older blind group, CA 14-18. Moreover, no significant improvement occurred between the years of 6 to 18 on three measures of spatial orientation and mental imagery, nor on a conservation of weight task, nor on four measures of formal thought. Deficiencies in spatial relationships also have been cited by Schmid-Kitsikis (1974). She posited that blindness contributes to disorganization of spatial notions and noted that age at onset of blindness was related to the degree of deficit. Responses by the

CA 6-10 blind group on a classificatory task which involved simultaneous categorization on two criteria, and on a task which required the ability to classify and reclassify objects did not indicate skill in classificatory logic; nor was complete mastery indicated in the performance of the CA 10-14 group. A particular lack of insight was noted for all three age groups of blind subjects on a class inclusion task. These results substantiate previous findings by Hatwell (1966) which demonstrated that the comprehension of a relationship occurs more readily when the related objects are presented simultaneously than when they are presented in succession; in the latter case there is greater need to rely on a memory factor.

The conclusion that Higgins (1973) drew from his work on the classificatory ability of congenitally blind children was that the deficiency exhibited by blind subjects in the sphere of classification was of figurative and symbolic rather than of operative origin. Present findings do not totally support his position. Certainly the failure of blind subjects to succeed on tasks of spatial orientation and mental imagery as well as on classificatory tasks suggests figurative deficits. Yet their extensive immaturity on conservation tasks implies operative deficits as well. (However, the previous study by Higgins did not involve conservation tasks.) Agreement is supplied for Higgins' suggestion that blind persons do succeed "in assembling sufficient of the behavioral raw materials to permit equilibration to carry on with the process of inner construction," but there is no agreement that this occurs "in a more or less normal manner" (Higgins, 1973, p. 35), if this implies normal tempo.

Actually, present findings indicate that acquisition of the flexibility and reversability of thought which characterized concrete level operations is achieved laboriously and painstakingly by blind subjects, and the time span involved in its achievement is greater than twice that required by sighted subjects. The *potential* for operational thought is there; difficulty is experienced in its *evolution*. True, the basis for the difficulty may be figurative in origin. Visual perception tends to promote simultaneity in classificatory thought; i.e., two objects may be explored visually at the same time, whereas tactual perception is successive. Usually exploration of objects is carried out singly. Therefore, the blind child has not been required to continually consider two objects simultaneously, and when classificatory tasks demand this skill, he lacks the required figurative simultaneity or duality ability.

Thus these blind subjects of average IQ did not achieve concrete level operational thought with the facility, dispatch, or completion that might have been assumed by their performance on the Wechsler Scales. Review of development over the twelve year period, CA 6-18, indicates that although improvement in concrete reasoning did proceed (albeit dilatorily) in most instances, logical thought which involved spatial orientation and mental imagery represented an area of continuing inability. Moreover, tasks involving formal or abstract thought generally were not attained by subjects who were 18, and were incomprehensible for younger subjects.

2. When scores for sighted subjects CA 6-10 were compared with scores for sighted subjects in the CA 10-14 group, significantly superior performance was exhibited by the older group on 19 of the 26 reasoning variables. Both groups had near optimum performance on a task involving simultaneous classification on two criteria, and both performed poorly on five measures of formal thought.

Comparison of reasoning scores for two age groups of sighted subjects, CA 10-14 and CA 14-18, resulted in eight significant F - ratios. Nonsignificant differences occurred on conservation of substance, weight, length, liquid, and term-to-term correspondence because near optimum performance was reached in the 10 to 14 age group. The level of reasoning needed for successful performance of the tasks developed in normals before their fourteenth year. The lack of improved performance between 6 and 14 years noted on three conservation of volume tasks and a task which involved two and three dimensional calculation indicated that the formal level of cognitive development required for their solution did not occur in normals younger than 14. Improved, but far from optimum performance was noted in the 14 to 18 age group, which suggested that the initiation rather than the achievement of the formal thought required in these tasks occurred in normals during this late adolescent period.

With the exception of a classificatory task (which was not achieved by the CA 14-18 group), a class inclusion task and a dual categorization task which were achieved by the CA 6-10 group, the Piagetian assessments involved in the study appeared to be measuring reasoning processes showing significant development in sighted subjects between the years 6 to 18. Data further indicate that the reasoning required in measures of concrete thought processes usually was well established in sighted subjects before their fourteenth year, but attainment of formal thought structures was not completely accomplished in the CA 14-18 group.

As noted in the Stephens, et al., (1969) study, these insufficiencies in formal thought processes in junior and senior high school students of normal intelligence serve to question current academic requirements which assume the presence of the ability to think abstractly in these groups of students.

3. Comparison of reasoning scores for the total group of sighted subjects with scores for the total group of blind subjects revealed the sighted group had superior performance on 23 of the 26 variables. Moreover, 18 of these differences were statistically significant. Superior, but not significantly superior performance for blind subjects occurred on three subscores of a hierarchical classification task; however, this difference probably was attributable to the previously discussed fact that the measure, as it was adapted for blind subjects, required a lower level of classificatory logic than was required in the original task.

Insufficiencies in the operational thought structure of blind subjects were emphasized when performance of the blind CA 14-18 group was compared with the sighted CA 6-10. On only 6 of the 26 variables was the performance of the older blind group significantly superior to that of the younger sighted group. Three of these superiorities occurred on the nonanalogous adaptation of the hierarchical classification task. The other three were conservation tasks which involved concrete thought. Thus, lack of vision and the ensuing curtailment of interaction with objects and people result in severe deficits in the reasoning processes of the blind. These findings are not unexpected. Blindness reduces the quantity as well as the quality of perceptive data reaching the subject (Hatwell, 1966); as a result, in logical reasoning, which relies heavily on their cognitive structuring of manipulated materials, the blind are seriously handicapped.

4. Factor analysis of scores for sighted subjects on psychoeducational and Piagetian reasoning measures resulted in eight factors, three of which were defined by Piagetian reasoning tasks, three by subscores from Wechsler Verbal and Wide Range Achievement Tests, and two by combined loadings (both Wechsler Verbal and Piagetian scores). The short-term memory basic to Wechsler Digit Span also was basic to the ability to visualize the rotation of an object in space before its actual rotation. The type of advanced reasoning which was basic to Piagetian tasks of combinatory logic also was basic to the Wechsler similarities test.

While the structure of reasoning in the blind subjects was somewhat analogous to that of the sighted, ten rather than eight factors were derived when scores for blind subjects on reasoning and psychoeducational measures were subjected to factor analysis. In this instance, four factors were exclusively Piagetian, two exclusively Wechsler Verbal and Wide Range Achievement Test, and four were defined by combined loadings from Wechsler Verbal and Piagetian measures. As in the factor analysis of sighted subjects' scores, Piagetian measures of combinatory logic and short term memory combined with Wechsler Verbal subscores for blind subjects to define two factors. Additionally, in the matrix derived from scores for blind subjects, tasks involving hierarchical classification and spatial relationships combined with Wechsler Verbal scales to define two factors. These results indicate that Piagetian reasoning scores for blind subjects have a higher degree of interrelationship with Wechsler Verbal subscores than do those for sighted subjects. The operational thought processes of blind subjects draw from a verbal component to a greater degree than do those of sighted subjects. Moreover, the higher interrelationship appears to derive from a compensatory rather than an enrichment process. This extreme reliance on or resort to "verbalisms" in the blind has been noted frequently. Perhaps the contribution of the current study is in the documentation of the relationship and the delineation of the areas of Piagetian reasoning most approximate to Wechsler verbal reasoning.

When coefficient of congruence techniques were applied for comparing factors obtained from the matrix derived from scores for sighted subjects with factors obtained from the matrix for scores for blind subjects, a high degree of congruence was noted among factors for the two groups, e.g., the conservation factor derived from sighted subjects scores had its highest relationship with the conservation factor derived from blind subjects' scores. It should be noted that the Wechsler Verbal factor for sighted subjects had its highest congruence with a factor for blind subjects which was defined not only by Wechsler Comprehension but also by five Piagetian reasoning variables. Also of interest was the fact that the factor in the matrix for sighted subjects which represented basic conservation ability (reversability and flexibility of thought) related not only to these same processes but also to measures of higher thought processes in the blind subjects. Again, these findings tend to indicate that the structure of Piagetian reasoning in blind subjects is not as independent of Wechsler Verbal performance as it is in sighted subjects. In addition, the performance of blind subjects on measures of formal reasoning is not dissimilar to the performance of sighted subjects on measures of concrete logic, a finding not unexpected when it is remembered that few significant differences existed when the reasoning performance of blind subjects CA 14-18 was compared to that of sighted subjects CA 6-10).

Moral Judgment

The previous Stephens, et al., (1969) study had demonstrated that logical reasoning and moral judgment were not highly interrelated. So the lack of difference between sighted and blind subjects on most of the scores on moral judgment variables in relation to major differences in operational thought was not a serendipitous finding; significant differences existed between the two groups on five of the fifteen moral judgment variables. In some instances, these differences may be explained, in part, on the basis of the story involved. For example, in stories involving falsehoods, the subject was to consider intention versus consequence in determining the gravity of the fabrication. One such moral judgment assessment involved stories of two boys. In the first story the boy intentionally gave wrong directions to a man, but, despite the misinformation, the man did not get lost. In the comparison story, a boy who had just moved to town gave a man what he thought were correct directions, but they were incorrect and the man got lost. The blind subjects generally decided the second situation was more serious, regardless of the positive intentions of the boy. Although responses of blind subjects indicated some consideration of intention versus consequence, the exceedingly traumatic interpretation the blind subjects gave to being lost probably influenced the final response. Another area in which blind subjects had difficulty was in their ability to verbalize rules for a game of bowling. Although the blind subjects generally had some knowledge of bowling, it did not extend to the rules for the game. Thus differences in the experiental backgrounds of blind and sighted subjects, as well as achieved levels of moral judgment, influenced their responses. Future studies should be cognizant of these unanticipated differences.

Comparison of the three age groups of blind subjects on moral judgment variables revealed that the greatest differences occurred between the CA 10-14 and CA 14-18 groups. By contrast, when comparisons were made among the three age groups of sighted subjects, differences between the CA 6-10 and CA 10-14 groups were more frequent than were differences between the CA 10-14 and CA 14-18 group. These data serve to suggest that major development in the moral judgment of blind children occurs at a somewhat later age than does the development of sighted children.

Relationships among measures of moral judgment were established through use of correlational techniques. Of the 105 intercorrelations, 26 were significant for the sighted subjects, 32 were significant for the blind subjects. Thus, moral judgment tended to generalize more frequently from one situation to another for blind subjects than for sighted, but the tendency to generalize was not marked for either group.

In summary, differences between blind and sighted subjects on measures of moral judgment were inconsequential in comparison to the major deficits evidenced by blind subjects on measures of reasoning. In the few instances where differences in the development of moral judgment did occur, the performance of the sighted tended to be superior, yet findings indicated the ability to generalize from one moral judgment situation occurred more frequently in the blind group. Again, however, differences were minor. What these findings serve to suggest is that concern over deficit performance in the blind should center on logical reasoning rather than moral judgment.

Moral Conduct

A previous study by Stephens, et al., (1969) served to establish the developmental nature of moral conduct in normal and mentally retarded subjects. The present study extends these findings to blind subjects. Acts of misconduct decrease as age increases.

When comparison was made of differences in moral conduct for sighted and blind subjects of the three age groups, strikingly similar patterns of performance were noted. Significant differences between CA 6-10 blind and sighted groups occurred on only three of the 14 variables; in two instances, the blind had superior performance, in the other the sighted did. The CA 10-14 and the CA 14-18 sighted groups each had significantly superior performance on three variables. On one of these variables the blind subjects' lack of experience with a stapler probably contributed to their poorer performance.

Findings by Hartshorne and May (1928) served to emphasize the situational determinants of such moral traits as honesty. By contrast, present findings tend to suggest that while moral conduct does not appear to generalize across traits - honesty and truthfulness - a specific trait such as honesty may generalize across situations. These findings serve to substantiate previous work by Grinder (1960, 1961) and Barbu (1951).

Comparison of the total group of sighted subjects with the total group of blind subjects indicated that, usually where differences occurred the sighted had superior performance. The development of moral conduct in sighted subjects was in advance of that for blind subjects. However, deficiencies in moral judgment and moral conduct did not approach the major performance deficits noted for blind subjects on measures of reasoning. It is noteworthy, however, that despite the effort exerted to assure that the adapted measures of moral behavior were analogous to the original measures, still, in some instances, lack of experience tended to penalize the performance of blind subjects. Thus the curtailed interaction of blind subjects with objects and people tended to affect development in each of the three areas; reasoning, moral judgment, and moral conduct. However, the area of reasoning reflected the most serious delays. Deficits in reasoning were SEVERE.

CHAPTER V - RECOMMENDATIONS

Implications which derive from the present comparison of the development of reasoning, moral judgment, and moral conduct, in normal congenitally blind and normal sighted subjects follow:

1. The adapted battery of Piagetian reasoning assessments can be used to determine the level of cognitive functioning attained by a blind school-aged individual and to analyze his/her operational thought processes.

To determine the equivalence of the adapted battery of instruments to the original battery, a study is suggested in which normally sighted subjects would be administered both batteries and comparison made of their performance scores.

2. The severe deficiencies found to exist in the reasoning abilities of the congenitally blind subjects serve to underline the necessity for blind persons to have extensive and intensive opportunities to engage in concrete reasoning as they interact with objects and people in ongoing situations.

3. There needs to be longitudinal study which will determine the course of cognitive development in blind children over an extended time span. Ideally, such a study would be begun at birth and would examine the sensory-motor and preoperational stages as well as the concrete and formal stages.

4. Findings from the present study suggest that class inclusion and classification tasks are particularly difficult for visually handicapped children. Further research is needed to analyze and trace this deficit developmentally.

5. The continuing unsuccessful performance by the blind subjects on tasks involving spatial orientation serves to underscore the need to explore remedial methods in this area, which are of particular importance since spatial orientation is basic to training in mobility.

6. Because of the present trend to place visually impaired pupils in regular classrooms, comparison on Piagetian reasoning assessments of blind students trained in residential school programs with blind students trained in regular school programs would serve to indicate whether the contributions of the program in one setting differs significantly from those in the other setting.

7. Since few significant differences were apparent when the moral development of blind and sighted pupils was compared; it is suggested that remedial efforts center on reasoning rather than on moral judgment or moral conduct.

The following discussion considers methods which probably could be employed to incorporate the two major findings of the study into home and school training efforts.

Use of Piagetian Assessments

The factorial validity of a battery of Piagetian reasoning assessments, which had been adapted for use with blind subjects, was determined in the present study. Inter-rater reliability had been obtained previously. Because the two groups of subjects (blind and sighted) who were included in the present study differed significantly in their Piagetian reasoning ability, although they were equated on verbal IQ, there is a strong suggestion that any differential diagnosis of a blind pupil's cognitive functioning should include his/her performance on the battery of Piagetian reasoning assessments. With this information it would then be possible to plan individually appropriate reasoning activities.

As DeVries (1974) noted "IQ tests are not derived from any theory of intelligence but are based, instead, on certain assumptions about intelligence.... To a large extent these items simply tap bits of surface information....In contrast Piaget's tasks are derived from...a research-based theory of intelligence....Piagetian tasks are concerned with how the individual views and reasons about reality....Each task has theoretical significance and in itself reveals something important about the individual's general development of his intelligence" (p.747).

All too frequently a dichotomy exists between assessment and programming. To prevent this there is recommendation that performance on the adapted battery of Piagetian reasoning assessments be used as a basis for planning experiences designed to supply an individual blind pupil with appropriate opportunities to interact with objects and people, to reason in ongoing situations. The battery can be used to identify educational needs of the blind; subsequent programs can be designed to serve these needs.

Remediation of Reasoning Deficits

Present findings, substantiated by previous research by Hatwell (1966), imply that although the blind can verbalize static or stored information, they are significantly impaired in their ability to reason logically in ongoing situations.

Because his theory serves to explain the progressive development of highly interrelated thought structures, Piaget questions the wisdom of attempts to accelerate development through drill in one specific area; rather he emphasizes the need to provide the child with opportunities for experiences commensurate with his level of cognitive functioning, and then to let the child do the experiencing. The suggestion is particularly applicable to blind children of average intelligence since they usually have the potential but not the type or quality of environmental interaction experiences required for the normal development of reasoning.

Therefore, a study is recommended which will determine whether blind subjects, given individually appropriate opportunities to reason in ongoing Piagetian based training situations, will demonstrate gains in cognitive development significantly greater than those exhibited by blind students of comparable age and IQ who are not provided these opportunities. The study also would determine if the type and quality of environmental interaction patterns that support and lead to cognitive growth can be developed within these blind students.

The recommended study would provide for (1) the remediation of cognitive and interaction functions and processes of pupils who are blind, (2) process oriented learning environments consisting of laboratory approaches designed to promote reasoning and interaction experiences through remediation modules, and (3) systems designed to effectively train teachers in the implementation of the student remediation system.

The suggested approach would involve a change from the traditional "active teacher-passive pupil" roles to one in which pupils actively inquire, explore, manipulate, and experiment as the teacher arranges individually appropriate opportunities for the inquiry and provides questions, not answers, which lead students to the formulation of classifications, comparisons, conclusions, and decisions, to interaction and progression in cognitive development. The approach would focus on an interactionist method of remediation by seeking to develop the general cognitive framework of the blind pupil. Effort would center on engineering the child's environment to improve the coordinated exercise of his existing cognitive structures within his present level of interaction competence. The emphasis would be on (1) the process rather than the content or product of knowledge, (2) the pupil's spontaneous adaptive behavior, and (3) theoretically-based and teacher-directed interaction between the pupil and peers, teacher, other adults, and the physical environment.

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TABLE 4

ANALYSES OF VARIANCE FOR REASONING POINT SCALE SCORES
FOR THE THREE AGE GROUPS OF BLIND SUBJECTS

Variables	6-10 (N=25)		10-14 (N=25)			6-10 (N=25)		14-18 (N=25)			10-14 (N=25)		14-18 (N=25)		
	$\bar{X}$	S.D.	$\bar{X}$	S.D.	F Ratio	$\bar{X}$	S.D.	$\bar{X}$	S.D.	F Ratio	$\bar{X}$	S.D.	$\bar{X}$	S.D.	F Ratio
Con. Sub.	12.16	8.63	15.32	7.63	1.88	12.16	8.63	19.44	3.65	15.10**	15.32	7.63	19.44	3.65	5.94*
1 to 1	8.16	2.64	10.12	2.13	8.35**	8.16	2.64	10.32	1.70	11.82**	10.12	2.13	10.32	1.70	.13
Sugar Wt.	5.32	3.20	4.72	3.42	.41	5.32	3.20	6.00	4.40	.39	4.72	3.42	6.00	4.40	1.32
Sugar Sub.	5.92	3.09	7.20	3.27	2.02	5.92	3.09	10.80	1.85	45.82**	7.20	3.27	10.80	1.85	23.01**
Sugar Vol.	1.56	1.08	1.84	1.37	.64	1.56	1.08	2.32	2.04	2.72	1.84	1.37	2.32	2.04	.95
Con. Wt.	9.84	8.64	11.88	8.13	.74	9.84	8.64	16.72	6.87	9.71**	11.88	8.13	16.72	6.87	5.17*
Term	19.20	5.28	23.64	3.75	11.76**	19.20	5.28	23.64	3.39	12.53**	23.64	3.75	23.64	3.39	0.00
Class.(3)	13.96	2.98	17.36	4.23	14.02**	13.96	2.98	17.88	3.53	18.02**	17.36	3.43	17.88	3.53	.28
Class.(4)	23.52	6.88	24.40	8.52	.16	23.52	6.88	31.40	5.28	20.65**	24.40	8.52	31.40	5.28	12.18**
Class.(5a)	2.40	2.00	1.80	1.66	1.33	2.40	2.00	3.00	2.20	1.02	1.80	1.66	3.00	2.20	4.75*
Class.(5b)	3.80	1.50	3.76	1.83	.01	3.80	1.50	5.32	1.11	16.61**	3.76	1.83	5.32	1.11	13.27**
Con. Vol.	5.24	3.92	5.56	3.88	.08	5.24	3.92	6.32	4.18	.89	5.56	3.88	6.32	4.18	.44
Con. Vol.(4)	5.20	3.23	4.60	2.06	.61	5.20	3.23	6.96	6.55	1.45	4.60	2.06	6.96	6.55	2.95
Bead Rot.	16.52	5.28	18.44	4.37	1.96	16.52	5.28	19.20	5.07	3.36	18.44	4.37	19.20	5.07	.32
Con. Len.	7.64	7.22	8.72	7.62	.26	7.64	7.23	12.04	7.54	4.45*	8.72	7.62	12.04	7.54	2.40
Rod Sec.	13.20	7.92	17.40	6.88	4.01	13.20	7.92	19.36	4.58	11.33**	17.40	6.88	19.36	4.58	1.41
Ch. Crit.	1.44	.82	1.84	.85	2.86	1.44	.82	2.16	.80	9.87**	1.84	.85	2.16	.80	1.88
Con. Liq.	11.28	7.25	15.48	7.08	4.30*	11.28	7.25	19.04	4.86	19.77**	15.48	7.08	19.04	4.86	4.30*
Beads	.28	.54	1.08	1.63	5.42*	.28	.54	1.76	1.85	14.67**	1.08	1.63	1.76	1.85	1.90
Wt. & Vol.	17.36	3.37	23.28	10.33	7.42**	17.36	3.37	28.52	15.81	11.92**	23.28	10.33	28.52	15.81	1.92
Inters.	15.76	3.97	19.12	3.76	9.44**	15.76	3.97	19.56	3.06	14.37**	19.12	3.76	19.56	3.06	.21
Sq. Rot.	1.72	1.28	1.80	1.22	.05	1.72	1.28	2.56	1.69	3.95	1.80	1.22	2.56	1.69	3.33
2-3D	5.36	1.73	6.36	1.68	4.30*	5.36	1.73	7.68	1.52	25.39**	6.36	1.68	7.68	1.52	8.49**
Per. Mob.	12.40	5.42	13.76	8.00	.49	12.40	5.42	16.64	7.82	4.97*	13.76	8.00	16.64	7.82	1.66
Per. Stat.	16.00	8.31	20.68	10.52	3.05	16.00	8.31	20.08	8.78	2.85	20.68	10.52	20.08	8.78	.05
Chem.	2.44	.51	2.52	.51	.31	2.44	.51	2.52	.59	.27	2.52	.51	2.52	.59	.00

df=1, 48 *p <.05 **p <.01

TABLE 5

ANALYSES OF VARIANCE FOR REASONING POINT SCALE SCORES
FOR THE THREE AGE GROUPS OF SIGHTED SUBJECTS

Variables	6-10 (N=25)		10-14 (N=25)			6-10 (N=25)		14-18 (N=25)			10-14 (N=25)		14-18 (N=25)		
	$\bar{X}$	S.D.	$\bar{X}$	S.D.	F Ratio	$\bar{X}$	S.D.	$\bar{X}$	S.D.	F Ratio	$\bar{X}$	S.D.	$\bar{X}$	S.D.	F Ratic
Con. Sub.	13.04	7.91	19.36	2.06	14.95**	13.04	7.91	19.80	1.23	17.84**	19.36	2.06	19.80	1.23	.84
1 to 1	10.56	2.36	11.80	.41	6.68*	10.56	2.36	12.00	0.00	9.27**	11.80	.41	12.00	0.00	6.00*
Sugar Wt.	7.08	4.18	9.20	4.28	3.14	7.08	4.18	10.40	3.29	9.73**	9.20	4.28	10.40	3.29	1.23
Sugar Sub.	6.12	3.37	9.72	2.51	18.35**	6.12	3.37	10.48	1.83	32.32**	9.72	2.51	10.48	1.83	1.50
Sugar Vol.	2.60	1.94	3.84	2.39	4.06*	2.60	1.94	4.72	1.95	14.90**	3.84	2.39	4.72	1.95	2.03
Con. Wt.	13.04	7.58	18.92	3.98	11.92**	13.04	7.58	18.08	4.05	8.61**	18.92	3.89	18.08	4.05	.56
Term	21.96	6.26	25.60	2.02	7.65**	21.96	6.26	25.52	1.39	7.70**	25.60	2.02	25.52	1.39	.03
Class. (3)	12.48	4.53	19.56	4.34	31.85**	12.48	4.53	18.52	4.37	23.03**	19.56	4.34	18.52	4.37	.71
Class (4)	17.68	8.60	26.40	9.13	12.08**	17.68	8.60	28.16	7.97	19.96**	26.40	9.13	28.16	7.97	.53
Class (5a)	1.04	.20	1.88	1.88	4.95*	1.04	.20	2.64	2.36	11.40**	1.88	1.88	2.64	2.36	1.59
Class (5b)	2.36	2.23	3.64	2.43	3.76	2.36	2.23	3.60	2.42	3.55	3.64	2.43	3.60	2.42	.00
Con. Vol.	12.40	7.78	14.24	4.09	1.10	12.40	7.78	17.28	4.74	7.18*	14.24	4.09	17.28	4.74	5.90*
Con. Vol. (4)	8.[illegible]	9.38	8.12	7.61	.00	8.28	9.38	16.20	13.81	5.62*	8.12	7.61	16.20	13.81	6.56*
Bd. Rot.	20.96	5.25	23.88	2.19	6.60*	20.96	5.25	23.56	2.80	4.78*	23.88	2.19	23.56	2.80	.20
Con. Len.	11.72	7.93	20.36	1.29	25.20**	11.72	7.93	20.08	1.58	26.73**	20.36	1.29	20.08	1.58	.47
Rod Sec.	14.32	7.44	20.72	.68	15.34**	14.32	7.44	20.04	1.14	14.43**	20.72	.68	20.04	1.14	6.61*
Ch. Crit.	1.92	.86	2.76	.52	17.35**	1.92	.86	2.80	.41	21.27**	2.76	.52	2.80	.41	.09
Con. Liq.	16.64	5.99	20.04	1.95	7.30**	16.64	5.99	20.04	1.10	7.80**	20.04	1.95	20.04	1.10	0.00
Beads	2.52	1.81	3.64	.91	7.68**	2.52	1.81	3.96	.20	15.71	3.64	.91	3.96	.20	2.97
Wt. & Vol.	28.52	14.07	32.40	10.97	1.18	28.52	14.07	45.12	18.55	12.71**	32.40	10.97	45.12	18.55	8.71**
Inters.	19.88	5.49	21.80	4.64	1.79	19.88	5.49	21.00	5.13	.56	21.80	4.64	21.00	5.13	.33
Sq. Rot.	2.44	1.19	3.92	1.58	13.98**	2.44	1.19	4.68	1.31	39.82**	3.92	1.58	4.68	1.31	3.42
2-3D	7.72	1.28	7.60	1.15	.92	7.72	1.28	8.72	1.06	9.08**	7.60	1.15	8.72	1.06	12.75**
Per. Mob.	15.00	8.08	23.04	7.76	12.88**	15.00	8.08	36.00	8.04	84.92**	23.04	7.76	36.00	8.04	33.65**
Per. Stat.	21.48	8.89	32.00	7.98	19.37**	21.48	8.89	40.80	5.44	85.87**	32.00	7.98	40.80	5.44	20.74**
Chem.	2.20	.58	2.60	.76	4.36*	2.20	.58	3.36	.86	31.34**	2.60	.76	3.36	.86	10.91**

df=1, 48 $^{*}\underline{p} < .05$ $^{**}\underline{p} < .01$

TABLE 6

DESCRIPTIVE STATISTICS FOR PSYCHO-EDUCATIONAL MEASURES FOR BLIND AND SIGHTED SUBJECTS

Variables	Sighted (N=25) 6-10		Blind (N=25) 6-10		Sighted (N=25) 10-14		Blind (N=25) 10-14		Sighted (N=25) 14-18		Blind (N=25) 14-18	
	$\bar{X}$	S.D.	$\bar{X}$	S.D.	$\bar{X}$	S.D.	$\bar{X}$	S.D.	$\bar{X}$	S.D.	$\bar{X}$	S.D.
WECHSLER INFORMATION	9.76	2.71	10.36	2.18	9.04	1.79	9.72	2.35	9.52	1.98	9.60	2.38
WECHSLER COMPREHENSION	8.88	2.28	8.72	1.77	8.04	2.09	8.00	2.02	10.20	2.78	9.80	2.80
WECHSLER ARITHMETIC	9.56	2.04	9.64	2.80	8.76	1.92	10.52	1.92	8.68	1.91	9.04	2.21
WECHSLER SIMILARITIES	8.80	2.93	11.80	2.52	10.88	2.39	10.32	1.80	10.36	1.87	10.88	2.11
WECHSLER VOCABULARY	10.64	2.53	8.44	2.48	9.72	2.49	8.72	2.48	9.28	1.31	8.36	1.96
WECHSLER DIGIT SPAN	10.12	3.09	11.44	2.58	9.88	2.33	12.20	3.11	11.20	2.43	11.80	2.33
VERBAL IQ	98.12	8.17	100.96	5.98	96.24	7.18	99.76	7.02	101.60	5.70	101.20	5.47
WRAT-SPELLING	97.16	9.02	93.60	13.66	97.16	16.13	100.60	18.86	92.12	9.73	89.00	11.18
WRAT-ARITHMETIC	96.24	6.08	87.56	6.73	90.52	8.97	82.44	8.33	90.68	9.10	76.64	8.66
WRAT-READING	98.64	10.12	88.48	10.26	101.72	15.62	95.36	14.70	96.32	11.99	95.04	16.23
ISC	46.52	6.19	58.54	14.14	48.08	8.51	54.00	12.31	53.28	6.59	57.54	16.32
CA	96.16	13.89	101.56	13.28	143.32	13.17	140.60	12.55	190.16	13.86	190.40	15.76
MA	93.96	15.58	101.84	15.32	137.76	14.80	140.04	14.74	193.68	22.23	192.72	19.58

TABLE 7

ANALYSES OF VARIANCE FOR PSYCHO-EDUCATIONAL MEASURES FOR TOTAL GROUP OF BLIND (N=75) AND FOR TOTAL GROUP OF SIGHTED (N=75) SUBJECTS

	Sighted (N=75)		Blind (N=75)		
	$\bar{X}$	S.D.	$\bar{X}$	S.D.	F Ratio
INFORMATION	9.45	2.17	9.89	2.30	1.45
COMPREHENSION	9.04	2.53	8.84	2.33	.41
ARITHMETIC	9.00	1.97	9.73	2.38	4.21*
SIMILARITIES	10.13	2.53	11.00	2.22	4.97*
VOCABULARY	9.93	2.18	8.51	2.29	15.24**
DIGIT SPAN	10.44	2.62	11.81	2.83	9.52**
IQ	98.81	7.48	100.64	6.14	2.67
WRAT-SPELLING	95.48	12.13	94.40	15.48	.23
WRAT-ARITHMETIC	92.48	8.49	82.21	9.04	51.40**
WRAT-READING	98.89	12.80	92.96	14.14	7.26**
ISC	49.29	7.65	56.69	14.28	16.15**
CA	143.21	40.91	144.19	39.10	.02
MA	142.05	44.31	145.04	40.70	.18

df = 1, 148
*$p < .05$
**$p < .01$

TABLE 8

ANALYSIS OF VARIANCE FOR REASONING POINT SCALE SCORES FOR TOTAL GROUP OF BLIND (N=75) AND TOTAL GROUP OF SIGHTED (N=75) SUBJECTS

	Blind		Sighted		
	$\overline{X}$	S.D.	$\overline{X}$	S.D.	F Ratio
Con. Sub.	15.64	7.50	17.40	5.64	2.63
1 to 1	9.53	2.37	11.45	1.51	34.96**
Sugar Wt.	5.35	3.70	8.76	4.25	27.53**
Sugar Sub.	7.97	3.46	9.01	3.39	3.45
Sugar Vol.	1.91	1.56	4.21	4.86	15.32**
Con. Wt.	12.81	8.33	17.17	7.23	11.72**
Term	22.16	4.67	24.95	6.82	8.53**
Class. (3)	16.40	3.71	17.48	7.56	1.23
Class. (4)	26.44	7.78	24.16	9.75	2.51
Class. (5a)	2.40	2.00	1.97	2.07	1.65
Class. (5b)	4.29	1.66	3.92	6.98	.20
Con. Vol.	5.71	3.97	15.00	6.14	121.30**
Con. Vol.(4)	5.59	4.44	11.37	11.66	16.15**
Bd. Rot.	18.05	4.98	23.13	4.96	39.17**
Con. Len.	9.47	7.60	17.91	7.25	48.44**
Rod Sec.	16.65	7.01	18.11	5.35	2.04
Ch. Crit.	1.81	.87	2.76	2.37	10.56**
Con. Liq.	15.27	7.15	18.76	4.10	13.46**
Beads	1.04	1.56	3.88	4.65	25.14**
Wt. & Vol.	23.05	11.85	35.83	16.55	29.54**
Inters.	18.15	3.96	21.11	5.54	14.19**
Sq. Rot.	2.03	1.44	3.80	1.77	45.22**
2-3D	6.47	1.88	8.87	8.47	5.74*
Per. Mob.	14.27	7.30	25.67	13.31	42.30**
Per. Stat.	18.92	9.37	31.88	11.38	57.98**
Chem.	2.49	.53	2.96	2.18	3.25

df=1,148
*$p < .05$
**$p < .01$

TABLE 9

ANALYSES OF VARIANCE FOR REASONING POINT SCALE SCORES
FOR BLIND AND SIGHTED SUBJECTS, CA 6-10, 10-14, 14-18

Variables	Blind 6-10 (N=25)		Sighted 6-10 (N=25)			Blind 10-14 (N=25)		Sighted 10-14 (N=25)			Blind 14-18 (N=25)		Sighted 14-18 (N=25)		
	$\overline{X}$	S.D.	$\overline{X}$	S.D.	F Ratio	$\overline{X}$	S.D.	$\overline{X}$	S.D.	F Ratio	$\overline{X}$	S.D.	$\overline{X}$	S.D.	F RATIO
Con. Sub.	12.16	8.63	13.04	7.91	.14	15.32	7.63	19.36	2.06	6.54*	19.44	3.65	19.80	1.23	.22
1 to 1	8.16	2.64	10.56	2.36	11.46**	10.12	2.13	11.80	.41	15.03**	10.32	1.70	12.00	0.00	24.39**
Sugar Wt.	5.32	3.20	7.08	4.18	2.79	4.72	3.42	9.20	4.28	16.70**	6.00	4.40	10.40	3.29	16.04**
Sugar Sub.	5.92	3.09	6.12	3.37	.05	7.20	3.27	9.72	2.51	9.36**	10.80	1.85	10.48	1.83	.38
Sugar Vol.	1.56	1.08	2.60	1.94	5.59*	1.84	1.37	3.84	2.39	13.13**	2.32	2.04	4.72	1.95	18.14**
Con. Wt.	9.84	8.64	13.04	7.58	1.94	11.88	8.13	18.92	3.89	15.26**	16.72	6.87	18.08	4.05	.73
Term	19.20	5.28	21.96	6.26	2.84	23.64	3.75	25.60	2.02	5.29*	23.64	3.39	25.52	1.39	6.59*
Class. (3)	13.96	2.98	12.48	4.53	1.86	17.36	4.23	19.56	4.34	3.96	17.88	3.53	18.52	4.37	.32
Class. (4)	23.52	6.88	17.68	8.60	7.03*	24.40	8.52	26.40	9.13	.64	31.40	5.28	28.16	7.97	2.87
Class. (5a)	2.40	2.00	1.04	.20	11.45**	1.80	1.65	1.88	1.88	.03	3.00	2.20	2.64	2.36	[illegible]
Class. (5b)	3.80	1.50	2.36	2.23	7.16*	3.76	1.83	3.64	2.43	.04	5.32	1.11	3.60	2.42	10.48**
Con. Vol.	5.24	3.92	12.40	7.78	16.90	5.56	3.88	14.24	4.09	59.27**	6.32	4.18	17.28	4.74	75.20**
Con. Vol.(4)	5.20	3.23	8.28	9.38	2.41	4.60	2.05	8.12	7.61	4.98*	6.96	6.55	16.20	13.81	9.13**
Bd. Rot.	16.52	5.28	20.96	5.25	8.90**	18.44	4.37	23.88	2.19	31.00**	19.20	5.07	23.56	2.80	14.18**
Con. Len.	7.64	7.22	11.72	7.93	3.62	8.72	7.62	20.36	1.29	56.74**	12.04	7.54	20.08	1.58	27.26**
Rod Sec.	13.20	7.92	14.32	7.44	.27	17.40	6.83	20.72	.68	5.77*	19.36	4.58	20.04	1.14	.52
Ch. Crit.	1.44	.82	1.92	.86	4.07*	1.84	.85	2.76	.52	21.03**	2.16	.80	2.80	.41	12.69**
Con. Liq.	11.28	7.25	16.64	5.99	8.13**	15.48	7.03	20.04	1.95	9.65**	19.04	4.86	20.04	1.10	1.01
Beads	.28	.54	2.52	1.81	35.30**	1.08	1.63	3.64	.91	47.04**	1.76	1.85	3.96	.20	34.77**
Wt. & Vol.	17.36	3.37	28.52	14.07	14.87**	23.28	10.33	32.40	10.97	9.16**	28.52	15.81	45.12	18.55	11.60**
Inters.	15.76	3.97	19.88	5.49	9.25**	19.12	3.75	21.80	4.64	5.04*	19.56	3.06	21.00	5.13	1.45
Sq. Rot.	1.72	1.28	2.44	1.19	4.25*	1.80	1.22	3.92	1.58	28.14**	2.56	1.69	4.68	1.31	24.60**
2-3D	5.36	1.73	7.72	1.28	30.16**	6.36	1.63	7.60	1.15	9.25**	7.68	1.52	8.72	1.06	7.87**
Per. Mob.	12.40	5.42	15.00	8.08	1.79	13.76	8.00	23.04	7.76	17.33**	16.64	7.82	36.00	8.04	74.57*
Per. Stat.	16.00	8.31	21.48	8.89	5.07*	20.68	10.52	32.00	7.98	18.37**	20.08	8.78	40.80	5.44	100.55**
Chem.	2.44	.51	2.20	.58	2.44	2.52	.51	2.60	.76	.19	2.52	.59	3.36	.86	16.28**

df= 1, 48   *$p < .05$ **$p < .01$

TABLE 10

ANALYSES OF VARIANCE FOR REASONING POINT SCALE SCORES FOR SIGHTED CA 6-10 AND BLIND CA 10-14, FOR SIGHTED CA 6-10 AND BLIND CA 14-18, AND FOR SIGHTED CA 10-14 AND BLIND CA 14-18 SUBJECTS

Variables	Blind 10-14 (N=25)		Sighted 6-10 (N=25)			Blind 14-18 (N=25)		Sighted 6-10 (N=25)			Blind 14-18 (N=25)		Sighted 10-14 (N=25)		
	$\bar{X}$	S.D.	$\bar{X}$	S.D.	F Ratio	$\bar{X}$	S.D.	$\bar{X}$	S.D.	F Ratio	$\bar{X}$	S.D.	$\bar{X}$	S.D.	F Ratio
Con. Sub.	15.32	7.63	13.04	7.91	1.08	19.44	3.65	13.04	7.91	13.50**	19.44	3.65	19.36	2.06	.01
1 to 1	10.12	2.13	10.56	2.36	.48	10.32	1.70	10.56	2.36	.17	10.32	1.70	11.80	.41	17.90**
Sugar Wt.	4.72	3.42	7.06	4.18	4.77*	6.00	4.40	7.08	4.18	.79	6.00	4.40	9.20	4.28	6.80*
Suger Sub.	7.20	3.27	6.12	3.37	1.32	10.80	1.85	6.12	3.37	37.06**	10.80	1.85	9.72	2.51	3.00
Sugar Vol.	1.84	1.37	2.60	1.94	2.56	2.32	2.04	2.60	1.94	.25	2.32	2.04	3.84	2.39	5.85*
Con. Wt.	11.88	8.13	13.04	7.58	.27	16.72	6.87	13.04	7.58	3.24	16.72	6.87	18.92	3.89	1.94
Term	23.64	3.75	21.96	6.26	1.32	23.64	3.39	21.96	6.26	1.39	23.64	3.39	25.60	2.02	6.17*
Class.(3)	17.36	3.43	12.48	4.53	18.46**	17.88	3.53	12.48	4.53	22.12**	17.88	3.53	19.56	4.34	2.26
Class.(4)	24.40	8.52	17.68	8.60	7.70**	31.40	5.28	17.68	8.60	46.19**	31.40	5.28	26.40	9.13	5.62*
Class.(5a)	1.80	1.66	1.04	.20	5.18*	3.00	2.20	1.04	.20	19.71	3.00	2.20	1.88	1.88	3.75
Class.(5b)	3.76	1.83	2.36	2.23	5.87*	5.32	1.11	2.36	2.23	35.23**	5.32	1.11	3.64	2.43	9.89**
Con. Vol.	5.56	3.88	12.40	7.78	15.47**	6.32	4.18	12.40	7.78	11.85**	6.32	4.18	14.24	4.09	45.90**
Con. Vol.(4)	4.60	2.06	8.28	9.38	3.67	5.96	6.55	8.28	9.38	.33	6.96	6.55	8.12	7.61	.33
Bd. Rot.	18.44	4.37	20.96	5.25	3.40	19.20	5.07	20.96	5.25	1.46	19.20	5.07	23.88	2.19	17.99**
Con. Len.	8.72	7.62	11.72	7.93	1.86	12.04	7.54	11.72	7.93	.02	12.04	7.54	20.36	1.29	25.57**
Rod Sec.	17.40	6.88	14.32	7.44	2.31	19.36	4.58	14.32	7.44	8.31**	19.36	4.58	20.72	.68	1.05
Ch. Crit.	1.84	.85	1.92	.86	.11	2.16	.80	1.92	.86	1.04	2.16	.80	2.76	.52	9.85**
Con. Liq.	15.48	7.08	16.64	5.99	.39	19.04	4.86	16.64	5.99	2.42	19.04	4.86	20.04	1.95	.91
Beads	1.08	1.63	2.52	1.81	8.76**	1.76	1.85	2.52	1.81	2.16	1.76	1.85	3.64	.91	20.73**
Wt. & Vol.	23.28	10.33	28.52	14.07	2.25	28.52	15.81	28.52	14.07	0.00	28.52	15.81	32.40	10.97	1.02
Inters.	19.12	3.76	19.88	5.49	.33	19.56	3.06	19.88	5.49	.06	19.56	3.06	21.80	4.64	4.07*
Sq. Rot.	1.80	1.22	2.44	1.19	3.50	2.56	1.69	2.44	1.19	.08	2.56	1.69	3.92	1.58	8.67**
2-3D	6.36	1.68	7.72	1.28	10.39**	7.68	1.52	7.72	1.28	.01	7.68	1.52	7.60	1.15	.67
Per. Mob.	13.76	8.00	15.00	8.08	.30	16.64	7.82	15.00	8.08	.53	16.64	7.82	23.04	7.76	8.44**
Per. Stat.	20.68	10.52	21.48	8.89	.08	20.08	8.78	21.48	8.89	.31	20.08	8.78	32.00	7.98	25.21**
Chem.	2.52	.51	2.20	.58	4.31	2.52	.59	2.20	.58	3.78	2.52	.59	2.60	.76	.17

df=1, 48 *$p < .05$ **$p < .01$

TABLE 11

ANALYSES OF COVARIANCE FOR REASONING POINT SCALE SCORES WITH CHRONOLOGICAL AGE HELD CONSTANT FOR BLIND AND SIGHTED GROUPS

Variable	Source of Variation	MS	F Ratio	Adjusted Means	
				Blind	Sighted
Con. Sub.	B	126.76	3.75	15.60	17.44
	W	33.82			
1 to 1	B	141.14	42.93**	9.52	11.46
	W	3.29			
Sugar Wt.	B	477.25	32.46**	5.34	8.90
	W	14.70			
Sugar Sub.	B	27.14	3.92*	7.95	8.80
	W	6.93			
Sugar Vol.	B	125.05	35.76**	1.90	3.73
	W	3.50			
Con. Wt.	B	580.75	12.96**	12.78	16.71
	W	44.81			
Term	B	189.14	11.67**	22.14	24.38
	W	16.20			
Class. (3)	B	9.51	.56	16.37	16.88
	W	17.14			
Class. (4)	B	191.75	3.16	26.39	24.13
	W	60.72			
Class. (5a)	B	10.76	3.06	2.39	1.86
	W	3.52			
Class. (5b)	B	43.62	11.10**	4.29	3.21
	W	3.93			
Con. Vol.	B	3014.80	123.87**	5.69	14.66
	W	24.34			
Con. Vol. (4)	B	1064.06	15.57**	5.56	10.89
	W	68.36			
Bd. Rot.	B	855.73	46.69**	18.04	22.82
	W	18.33			
Con. Len.	B	2387.61	56.75**	9.44	17.42
	W	42.07			
Rod Sec.	B	118.06	3.87	16.62	18.39
	W	30.49			
Ch. Crit.	B	17.79	34.07**	1.81	2.50
	W	.52			
Con. Liq.	B	514.72	19.42**	15.23	18.94
	W	26.51			
Beads	B	207.06	127.25**	1.03	3.38
	W	1.63			
Wt. & Vol.	B	5815.85	36.28**	22.97	35.43
	W	160.29			
Inters.	B	287.88	14.46**	18.13	20.91
	W	19.91			
Sq. Rot.	B	104.41	52.01**	2.02	3.69
	W	2.01			
2-3D	B	91.75	44.71**	6.46	8.02
	W	2.05			
Per. Mob.	B	4163.90	59.92**	14.20	24.72
	W	69.50			
Per. Stat.	B	5978.12	75.20**	18.86	31.49
	W	79.49			
Chem.	B	2.04	4.53*	2.49	2.72
	W	.45			

b = between groups
w = within groups

df = 1, 147
* = $\underline{p} < .05$
** = $\underline{p} < .01$

TABLE 12

ANALYSES OF COVARIANCE FOR REASONING POINT SCALE SCORES WITH MENTAL AGE HELD CONSTANT FOR BLIND AND SIGHTED GROUPS

Variable	Source of Variation	MS	F Ratio	Adjusted Means	
				Blind	Sighted
Con. Sub.	B	147.82	4.36*	15.53	17.51
	W	33.87			
1 to 1	B	146.93	45.51**	9.50	11.48
	W	3.23			
Sugar Wt.	B	486.48	32.91**	5.32	8.92
	W	14.78			
Sugar Sub.	B	33.71	4.96*	7.90	8.8[illegible]
	W	6.80			
Sugar Vol.	B	127.92	36.23**	1.89	[illegible]
	W	3.53			
Con. Wt.	B	619.03	13.81**	12.71	[illegible].78
	W	44.82			
Term	B	202.91	12.31**	22.10	24.42
	W	16.48			
Class. (3)	B	13.35	.77	16.33	16.93
	W	17.24			
Class. (4)	B	160.25	2.68	26.29	24.23
	W	59.89			
Class. (5a)	B	9.88	2.82	2.38	1.87
	W	3.50			
Class. (5b)	B	41.23	10.58**	4.27	3.22
	W	3.90			
Con. Vol.	B	3056.62	126.32**	5.66	14.69
	W	24.20			
Con. Vol. (4)	B	1089.58	16.07**	5.52	10.93
	W	68.38			
Bd. Rot.	B	876.66	48.10**	18.01	22.85
	W	18.22			
Con. Len.	B	2460.98	59.86**	9.37	17.48
	W	41.11			
Rod Sec.	B	134.60	4.34*	16.56	18.45
	W	31.00			
Ch. Crit.	B	18.60	35.21**	1.80	2.51
	W	.53			
Con. Liq.	B	550.36	21.10**	15.17	19.00
	W	26.08			
Beads	B	212.18	128.59**	1.02	3.40
	W	1.65			
Wt. & Vol.	B	6121.43	39.45**	22.81	35.59
	W	155.18			
Inters.	B	300.24	15.44**	18.10	20.94
	W	19.45			
Sq. Rot.	B	108.29	55.33**	2.00	3.70
	W	1.96			
2-3D	B	95.71	47.09**	6.44	8.04
	W	2.03			
Per. Mob.	B	4357.44	64.43**	14.08	24.87
	W	67.63			
Per. Stat.	B	6204.75	80.60**	18.74	31.61
	W	76.99			
Chem.	B	2.30	5.21*	2.48	2.73
	W	.44			

b = between groups
w = within groups

df = 1, 147
* = $p < .05$
** = $p < .01$

TABLE 13

ANALYSES OF COVARIANCE FOR REASONING POINT SCALE SCORES WITH CHRONOLOGICAL AGE AND MENTAL AGE HELD CONSTANT FOR BLIND AND SIGHTED GROUPS

Variable	Source of Variation	MS	F Ratio	Adjusted Means	
				Blind	Sighted
Con. Sub.	B	135.06	3.98*	15.57	17.47
	W	33.93			
1 to 1	B	416.99	45.25**	9.50	11.49
	W	3.25			
Sugar Wt.	B	466.57	31.54**	5.35	8.89
	W	14.79			
Sugar Sub.	B	31.95	4.68*	7.91	8.84
	W	6.83			
Sugar Vol.	B	121.39	34.56**	1.91	3.72
	W	3.51			
Con Wt.	B	593.78	13.19**	12.75	16.75
	W	45.01			
Term	B	183.74	11.27**	22.15	24.37
	W	16.30			
Class. (3)	B	10.51	.61	16.36	16.89
	W	17.24			
Class. (4)	B	160.05	2.65	26.30	24.22
	W	60.30			
Class. (5a)	B	9.70	2.75	2.38	1.87
	W	3.53			
Class. (5b)	B	40.37	10.29**	4.27	3.23
	W	3.92			
Con. Vol.	B	3034.89	124.58**	5.65	14.70
	W	24.36			
Con. Vol. (4)	B	1069.51	15.55**	5.54	10.91
	W	68.79			
Bd. Rot.	B	870.39	47.44**	18.01	22.85
	W	18.35			
Con. Len.	B	2497.25	60.72**	9.32	17.53
	W	41.13			
Rod Sec.	B	114.68	3.74	16.63	18.39
	W	30.69			
Ch. Crit.	B	17.65	33.57**	1.81	2.50
	W	.53			
Con Liq.	B	546.26	20.80**	15.17	19.01
	W	26.26			
Beads	B	205.14	125.22**	1.03	3.38
	W	1.64			
Wt. & Vol.	B	6214.01	39.94**	22.73	35.67
	W	155.57			
Inters.	B	329.32	17.35**	18.03	21.01
	W	18.98			
Sq. Rot.	B	109.46	55.77**	1.99	3.71
	W	1.96			
2-3D	B	94.21	46.05**	6.44	8.04
	W	2.05			
Per. Mob.	B	4341.49	63.79**	14.67	24.88
	W	68.06			
Per. Stat.	B	6233.70	80.65**	18.69	31.65
	W	77.29			
Chem.	B	2.43	5.50*	2.48	2.73
	W	.44			

b = between groups
w = within groups

df = 1, 146
* = p < .05
** = p < .01

TABLE 14

INTERCORRELATIONS OF POINT SCALE SCORES FOR REASONING VARIABLES FOR BLIND (N=75) AND SIGHTED (N-75)* SUBJECTS

Variables	Con. Sub.	1 to 1	Sugar Wt.	Sugar Sub.	Sugar Vol.	Con. Wt.	Term	Class.(3)	Class.(4)	Class.(5a)	Class.(5b)	Con. Vol.	Con. Vol.(4)	Bd. Rot.	Con. Len.	Rod Sec.	Ch. Crit.	Con. Liq.	Beads	Wt. & Vol.	Inters.	Sq. Rot.	2-3D	Per. Mob.	Per. Stat.	Chem.
Con. Sub.		.55	.44	.72	.37	.77	.61	.43	.37	.22	.23	.46	.14	.31	.62	.83	.56	.73	.56	.37	.15	.43	.33	.51	.54	.45
1 to 1	.31		.26	.55	.15	.53	.45	.34	.33	.15	.11	.42	.14	.18	.37	.46	.30	.57	.36	.27	.12	.30	.40	.35	.44	.34
Sugar Wt.	.09	.03		.39	.47	.41	.42	.31	.31	.16	.23	.30	.30	.30	.33	.47	.42	.35	.31	.45	.32	.28	.18	.34	.43	.32
Sugar Sub.	.63	.38	.21		.22	.59	.38	.44	.41	.29	.17	.31	.12	.27	.47	.55	.45	.54	.34	.34	.14	.34	.28	.48	.45	.43
Sugar Vol.	.05	.13	.57	.19		.18	.32	.16	.18	.18	.07	.27	.30	.32	.25	.36	.26	.24	.29	.37	.15	.29	.12	.36	.45	.17
Con. Wt.	.66	.22	.01	.65	.03		.64	.46	.29	.22	.11	.52	.15	.25	.52	.74	.47	.63	.36	.30	.19	.32	.30	.39	.43	.29
Term	.38	.47	-.12	.35	.09	.27		.38	.32	.17	.20	.38	.15	.31	.46	.66	.46	.54	.42	.36	.27	.31	.28	.35	.48	.34
Class.(3)	.33	.48	.04	.39	.15	.32	.25		.74	.48	.48	.16	.13	.26	.45	.51	.38	.40	.43	.28	.10	.25	.10	.47	.50	.34
Class.(4)	.30	.48	.03	.46	.08	.38	.27	.33		.47	.54	.12	.15	.02	.36	.44	.35	.36	.34	.30	.15	.23	.11	.42	.41	.41
Class.(5a)	.07	.03	-.09	.17	-.13	.08	-.02	.18	.26		.26	.18	.14	.12	.17	.19	.20	.19	.17	.36	.10	.18	.15	.44	.37	.22
Class.(5b)	.21	.32	.16	.40	.11	.31	.15	.26	.44	.36		.24	.07	.18	.26	.26	.20	.35	.22	.06	.13	.13	.06	.32	.36	.44
Con. Vol.	.42	.21	.05	.41	.11	.48	.27	.27	.24	.16	.30		.15	.42	.52	.44	.46	.20	.40	.14	.29	.29	.39	.40	.39	.26
Con Vol.(4)	.11	.16	.15	.21	.31	.15	.09	.12	.13	.15	.16	.34		.11	.27	.18	.21	.19	.11	.68	.31	.26	.36	.37	.33	.36
Bd. Rot.	.23	.34	-.17	.22	.08	.37	.18	.33	.25	.10	.09	.29	.16		.11	.30	.32	.27	.26	.14	.11	.38	.06	.27	.24	.14
Con. Len.	.36	.27	.04	.47	.02	.58	.27	.42	.27	.23	.24	.48	.21	.28		.63	.44	.43	.34	.36	.16	.43	.21	.43	.48	.43
Rod Sec.	.75	.37	.13	.50	.01	.53	.32	.37	.32	.15	.20	.30	.17	.30	.42		.66	.75	.52	.39	.17	.36	.26	.47	.54	.34
Ch. Crit.	.27	.29	.01	.36	.20	.31	.28	.39	.31	.14	.13	.18	.09	.37	.21	.23		.60	.59	.42	.26	.42	.22	.42	.49	.46
Con Liq.	.66	.47	-.01	.58	-.07	.61	.28	.44	.45	.13	.24	.29	.16	.30	.41	.61	.41		.44	.39	.29	.35	.25	.42	.47	.35
Beads	.28	.18	-.05	.29	-.10	.11	.10	.28	.22	.22	.09	.18	-.03	.22	.12	.22	.23	.32		.35	.26	.36	.28	.45	.58	.33
Wt. & Vol.	.29	.22	.03	.29	.21	.25	.18	.27	.29	.33	.31	.29	.54	.31	.04	.30	.27	.26	.23		.43	.37	.47	.57	.56	.51
Inters.	.40	.40	-.08	.43	.05	.45	.35	.45	.27	.14	.23	.38	-.05	.45	.40	.35	.49	.48	.25	.20		.13	.18	.03	.10	.19
Sq. Rot.	.21	.18	-.19	.20	-.20	.26	.10	.15	.10	.15	.25	-.03	-.05	.19	.08	.19	.20	.34	.14	.15	.27		.24	.47	.53	.40
2-3D	.35	.38	.20	.41	.14	.33	.20	.32	.46	.19	.34	.20	.27	.10	.27	.34	.22	.50	.11	.26	.35	.28		.36	.37	.39
Per. Mob.	.05	.06	-.12	.10	.01	.13	-.01	.02	.05	-.11	-.07	-.11	-.04	.02	.13	.12	-.09	.17	.08	-.05	.12	.02	.08		.80	.48
Per. Stat.	.10	.28	.04	.20	.20	.26	.21	.21	.27	-.00	.11	-.00	-.19	.24	.24	.14	.33	.19	-.03	-.07	.41	.14	.17	.32		.47
Chem.	.27	.05	.05	.03	.06	.09	.14	.08	.06	.17	-.03	.05	-.10	-.05	.07	.30	.23	.22	-.02	.08	.19	.19	.02	-.24	-.01	

* The values above the diagonal represent intercorrelations of data on sighted (N=75); values below the diagonal represent intercorrelations of data on blind (N=75); $p < .05$, $p < .01$ are .23 and .30 respectively.

TABLE 15

CORRELATIONS OF MEASURES OF REASONING WITH CHRONOLOGICAL AGE,
MENTAL AGE AND WECHSLER SCALES FOR BLIND (N=75) *
SUBJECTS

Variables	Con. Sub.	1 to 1	Sugar Wt.	Sugar Sub.	Sugar Vol.	Con. Wt.	Term	Class. (3)	Class. (4)	Class. (5a)	Class. (5b)	Con. Vol.	Con. Vol.(4)	Bd. Rot.	Con. Len.	Rod Sec.	Ch. Crit.	Con. Liq.	Beads	Wt. & Vol.	Inters.	Sq. Rot.	2-3D	Per. Mob.	Per. Stat.	Chem.
INFORMATION	.20	.01	.27	.06	.10	.20	-.01	-.04	-.11	-.03	.02	.20	.08	.03	.23	.12	.05	.12	-.10	.03	.19	.05	.02	-.03	.11	.13
COMPREHENSION	.15	.02	.08	.20	-.09	.10	.02	-.05	.32	-.06	.11	.06	-.07	02	.11	.11	-.03	.14	.09	.01	.14	.11	.15	.13	.02	-.04
ARITHMETIC	.16	.21	-.18	.06	-.10	.26	-.08	.13	-.02	.07	.17	.11	-.02	.31	.08	.12	.15	.24	-.11	.09	.30	.01	.11	.04	.18	-.20
SIMILARITIES	-.01	-.07	.11	-.01	.07	-.08	.05	-.05	-.09	.05	-.15	-.03	.08	-.20	.07	.01	-.09	-.08	-.05	.08	-.14	.07	-.06	-.03	-.17	.24
VOCABULARY	-.02	-.03	-.09	.06	-.08	.07	.10	.10	.05	-.09	.10	.14	-.04	.08	.19	-.04	.03	-.11	-.01	.04	.17	.19	-.12	-.12	.17	.11
DIGIT SPAN	.08	.33	-.26	-.03	-.14	.04	.01	.15	.10	-.05	.05	.09	-.05	-.00	.08	.02	.11	.18	-.07	.07	.14	.09	.14	.21	.18	-.02
IQ	.22	.22	-.07	.19	-.10	.25	.07	.11	.15	-.03	.17	.25	-.04	.13	.28	.11	.14	.24	-.03	.14	.39	.25	.19	.10	.20	.08
CA	43	.41	.06	.62	.12	.36	.43	.39	.48	.13	.35	.15	.19	.28	.20	.41	.38	.51	.47	.42	.39	.29	.51	.17	.13	.06
MA	.45	.45	.05	.65	.10	.40	.44	.42	.49	.13	.37	.19	.16	.30	.26	.41	.39	.55	.45	.44	.47	.34	.54	.18	.17	.08

* $\underline{p} < .05$; $\underline{p} < .01$ are .22 and .29 respectively

TABLE 16

CORRELATIONS OF MEASURES OF REASONING WITH CHRONOLOGICAL AGE, MENTAL AGE AND WECHSLER SCALES FOR SIGHTED (N=75) * SUBJECTS

Variables	Con. Sub.	1 to 1	Sugar Wt.	Sugar Sub.	Sugar Vol.	Con. Wt.	Term	Class (3)	Class (4)	Class (5a)	Class (5b)	Con. Vol.	Con. Vol. (4)	Bd. Rot.	Con. Len.	Rod Sec.	Ch. Crit.	Con. Liq.	Beads	Wt. & Vol.	Inters.	Sq. Rot.	2-3D	Per. Mob.	Per. Stat.	Chem.
INFORMATION	.14	.31	.12	.18	.15	.02	.08	-.12	.05	.00	.04	.14	.15	.11	.05	.07	-.07	.16	.14	.22	.22	-.06	.01	.11	.08	-.02
COMPREHENSION	-.08	-.06	-.07	-.06	.02	-.20	-.19	-.22	-.17	-.12	-.04	.13	.14	-.01	.04	-.16	-.02	-.04	-.05	.04	.04	.23	.17	-.01	.01	.11
ARITHMETIC	-.06	-.09	-.17	-.15	-.16	-.05	-.11	-.05	-.06	.03	-.09	-.10	-.10	.08	.14	-.06	-.18	-.04	-.04	-.07	.04	.01	-.07	.03	-.09	.03
SIMILARITIES	.02	.03	.04	.05	-.03	-.01	-.13	.34	.31	.16	.28	-.25	.00	-.06	.16	.02	.10	.09	.19	.04	.00	.13	-.18	.16	.21	.25
VOCABULARY	-.07	.12	.02	.05	-.18	.06	-.05	-.01	.09	.02	.04	.10	.01	-.12	-.10	-.01	-.03	.07	.00	-.03	.11	-.19	-.11	-.21	-.22	-.11
DIGIT SPAN	.15	.19	.02	.24	.04	.18	.26	.21	.31	.26	.11	.13	.04	-.02	.18	.09	-.01	.18	.09	.12	.13	.24	.16	.28	.31	.20
IQ	.08	.21	.03	.18	-.02	.02	-.02	.08	.22	.18	.12	.07	.10	.03	.21	.02	-.01	.18	.16	.21	.19	.18	.06	.25	.22	.24
CA	.58	.46	.36	.63	.38	.44	.42	.49	.45	.34	.26	.36	.27	.29	.54	.53	.53	.43	.48	.50	.09	.51	.40	.75	.78	.59
MA	.54	.45	.34	.62	.36	.39	.38	.47	.46	.36	.27	.34	.27	.29	.53	.49	.49	.42	.48	.53	.12	.51	.38	.77	.78	.61

* $p < .05$; $p < .01$ are .22 and .29 respectively

TABLE 17

ANALYSES OF VARIANCE FOR MORAL JUDGMENT POINT SCALE SCORES FOR BLIND SUBJECTS

Variable	N=25					N=25					N=25				
	6-10		10-14			10-14		14-18			6-10		14-18		
	$\bar{X}$	S.D.	$\bar{X}$	S.D.	F	$\bar{X}$	S.D.	$\bar{X}$	S.D.	F	$\bar{X}$	S.D.	$\bar{X}$	S.D.	F
Lying Story #1	2.40	.71	2.80	.50	5.33*	2.80	.50	2.80	.41	.00	2.40	.71	2.80	.41	6.00*
Lying Story #2	1.92	.86	2.52	.71	7.18*	2.52	.71	1.88	.83	8.51**	1.92	.86	1.88	.83	.03
Lying Story #3	1.92	1.00	1.72	.98	.51	1.72	.98	2.32	.95	4.86*	1.92	1.00	2.32	.95	2.12
Justice #3	2.24	.83	2.20	.71	.03	2.20	.71	2.12	.67	.17	2.24	.83	2.12	.67	.32
Justice #4	1.40	.76	2.08	.81	9.30*	2.08	.81	2.04	.84	.03	1.40	.76	2.04	.84	7.94**
Clumsiness #1	2.21	.91	2.08	1.00	.20	2.08	1.00	2.40	.91	1.40	2.21	.91	2.40	.91	.60
Clumsiness #2	2.28	.94	1.96	1.02	1.34	1.96	1.02	2.68	.75	8.10**	2.28	.94	2.68	.75	2.78
Clumsiness #3	1.80	.96	2.12	1.01	1.32	2.12	1.01	2.68	.75	4.94*	1.80	.96	2.68	.75	13.11**
Clumsiness #4	2.40	.82	2.64	.64	1.34	2.64	.64	2.72	.68	.18	2.40	.82	2.72	.68	2.27
Clumsiness #5	2.00	1.00	2.08	.97	.08	2.08	1.00	2.72	.68	7.05**	2.00	1.00	2.72	.68	8.88**
Collective Responsibility #1	3.64	.99	3.36	1.19	.88	3.36	1.19	3.64	.76	.99	3.64	.91	3.64	.76	.00
Collective Responsibility #2	2.24	.83	2.28	.79	.03	2.28	.79	2.40	.91	.25	2.24	.83	2.40	.91	.42
Collective Responsibility #3	3.28	.89	3.20	.96	.09	3.20	.96	3.80	.41	8.31**	3.28	.89	3.80	.41	7.04*
Has Rules	2.28	.74	2.52	.51	1.79	2.52	.51	2.76	.44	3.20	2.28	.74	2.76	.44	7.85**
Changes Rules	2.12	.78	2.00	.65	.35	2.00	.65	2.56	.51	11.64**	2.12	.78	2.56	.51	5.58*

df = 1, 148 *p <.05 **p <.01

TABLE 18

ANALYSES OF VARIANCE FOR MORAL JUDGMENT POINT SCALE SCORES FOR SIGHTED SUBJECTS

	N=25					N=25					N=25				
Variable	6-10		10-14			10-14		14-18			6-10		14-18		
	$\bar{X}$	S.D.	$\bar{X}$	S.D.	F	$\bar{X}$	S.D.	$\bar{X}$	S.D.	F	$\bar{X}$	S.D.	$\bar{X}$	S.D.	F
Lying Story #1	2.76	.66	2.92	.28	1.24	2.92	.28	3.00	.00	2.09	2.76	.66	3.00	.00	3.27
Lying Story #2	2.12	.93	2.80	.82	7.57**	2.80	.82	2.52	.87	1.37	2.12	.93	[illegible]	.87	2.46
Lying Story #3	1.80	1.00	2.52	.87	7.36**	2.52	.87	2.84	.55	2.40	1.80	1.00	2.84	.55	20.69**
Justice #3	2.52	.87	2.76	.88	.94	2.76	.88	2.28	.98	3.32	2.52	.87	2.28	.98	.84
Justice #4	1.76	.97	2.60	1.00	9.09**	2.60	1.00	1.64	.95	12.08**	1.76	.97	1.64	.95	.19
Clumsiness #1	1.56	.92	1.64	.95	.09	1.64	.95	2.68	.74	18.44**	1.56	.92	2.68	.75	22.00**
Clumsiness #2	1.56	.92	2.12	1.01	4.20*	2.12	1.01	2.92	.40	13.48**	1.56	.92	2.92	.40	46.24**
Clumsiness #3	1.80	1.00	2.52	1.05	6.19*	2.52	1.05	2.92	.40	3.19	1.80	1.00	2.92	.40	27.03**
Clumsiness #4	2.64	.70	2.84	.55	1.26	2.84	.55	2.84	.55	.00	2.64	.70	2.84	.55	1.26
Clumsiness #5	1.84	.99	2.44	.92	4.95*	2.44	.92	2.84	.55	3.49	1.84	.99	2.84	.55	19.53**
Collective Responsibility #1	3.92	.40	3.88	.60	.08	3.88	.60	3.72	.68	.78	3.92	.40	3.72	.68	1.51
Collective Responsibility #2	1.40	1.00	1.96	1.43	2.58	1.96	1.43	3.20	1.00	12.64**	1.40	1.00	3.20	1.00	40.50**
Collective Responsibility #3	3.36	1.00	2.84	1.43	2.22	2.84	1.43	3.76	.52	9.08**	3.36	1.00	3.76	.52	3.17
Has Rules	2.60	.76	2.88	.44	2.52	2.88	.44	2.96	.20	.69	2.60	.76	2.96	.20	5.20*
Changes Rules	1.84	.47	2.04	.79	1.18	2.04	.79	2.24	.72	.87	1.84	.47	2.24	.72	5.36*

df = 1, 48 $\quad$ *$p < .05$ $\quad$ **$p < .01$

TABLE 19

ANALYSES OF VARIANCE FOR MORAL JUDGMENT POINT SCALE SCORES FOR TOTAL GROUPS OF SUBJECTS, SIGHTED AND BLIND

	N=75				
Variables	Blind		Sighted		
	$\bar{X}$	S.D.	$\bar{X}$	S.D.	F
Lying Story #1	2.80	.41	2.80	.50	.00
Lying Story #2	2.11	.85	2.48	.91	6.79*
Lying Story #3	1.99	.99	2.39	.93	6.49*
Justice #3	2.19	.73	2.52	.92	6.04*
Justice #4	1.84	.85	2.00	1.05	1.04
Clumsiness #1	2.23	.94	1.01	1.96	2.82
Clumsiness #2	2.31	.94	2.20	.99	.46
Clumsiness #3	2.20	.97	2.41	.97	1.80
Clumsiness #4	2.59	.72	2.78	.61	2.95
Clumsiness #5	2.27	.95	2.37	.93	.48
Collective Responsibility #1	3.55	.96	3.84	.57	5.15*
Collective Responsibility #2	2.31	.84	2.19	1.37	.42
Collective Responsibility #3	3.43	.82	3.32	1.10	.45
Has Rules	2.52	.60	2.81	.54	9.93**
Changes Rules	2.23	.69	2.04	.69	2.76

df = 1, 148
* = $p < .05$
** = $p < .01$

TABLE 20

ANALYSES OF VARIANCE FOR MORAL JUDGMENT POINT SCALE SCORES FOR SIGHTED AND BLIND SUBJECTS

Variable	N=25					N=25					N=25				
	Blind 6-10		Sighted 6-10			Blind 10-14		Sighted 10-14			Blind 14-18		Sighted 14-18		
	$\bar{X}$	S.D.	$\bar{X}$	S.D.	F	$\bar{X}$	S.D.	$\bar{X}$	S.D.	F	$\bar{X}$	S.D.	$\bar{X}$	S.D.	F
Lying Story #1	2.40	.71	2.76	.66	3.45	2.80	.50	2.92	.28	1.10	2.80	.41	3.00	.00	6.00*
Lying Story #2	1.92	.86	2.12	.93	.62	2.52	.71	2.80	.82	1.67	1.88	.83	2.52	.87	7.05*
Lying Story #3	1.92	1.00	1.80	1.00	.18	1.72	.98	2.52	.87	9.30**	2.32	.95	2.84	.55	5.63*
Justice #3	2.24	.83	2.52	.87	1.35	2.20	.71	2.76	.88	6.16*	2.12	.67	2.28	.98	.46
Justice #4	1.40	.76	1.76	.97	2.13	2.08	.81	2.60	1.00	4.07*	2.04	.84	1.64	.95	2.48
Clumsiness #1	2.21	.91	1.56	.92	6.12*	2.08	1.00	1.64	.95	2.55	2.40	.91	2.68	.75	1.41
Clumsiness #2	2.28	.94	1.56	.92	7.55**	1.96	1.02	2.12	1.01	.31	2.68	.75	2.92	.40	2.00
Clumsiness #3	1.80	.96	1.80	1.00	.00	2.12	1.01	2.52	1.05	1.89	2.68	.75	2.92	.40	2.00
Clumsiness #4	2.40	.82	2.64	.70	1.25	2.64	.64	2.84	.55	1.40	2.72	.68	2.84	.55	.47
Clumsiness #5	2.00	1.00	1.84	.99	.32	2.08	1.00	2.44	.92	1.77	2.72	.68	2.84	.55	.47
Collective Responsibility #1	3.64	.91	3.92	.40	1.99	3.36	1.19	3.88	.60	3.83	3.64	.76	3.72	.68	.15
Collective Responsibility #2	2.24	.83	1.40	1.00	10.44**	2.28	.79	1.96	1.43	.96	2.40	.91	3.20	1.00	8.73**
Collective Responsibility #3	3.28	.89	3.36	1.00	.09	3.20	.96	2.84	1.43	1.09	3.80	.41	3.76	.52	.09
Has Rules	2.28	.74	2.60	.76	2.27	2.52	.51	2.88	.44	7.15*	2.76	.44	2.96	.20	4.35*
Changes Rules	2.12	.78	1.84	.47	2.35	2.00	.65	2.04	.79	.04	2.56	.51	2.24	.72	3.28

df = 1, 48   *$p < .05$ **$p < .01$

TABLE 21

ANALYSES OF VARIANCE FOR MORAL JUDGMENT POINT SCALE SCORES FOR
SIGHTED AND BLIND SUBJECTS OF VARIOUS AGE GROUPS

	N=25					N=25					N=25				
Variables	Blind 10-14		Sighted 6-10			Blind 14-18		Sighted 6-10			Blind 14-18		Sighted 10-14		
	$\overline{X}$	S.D.	$\overline{X}$	S.D.	F	$\overline{X}$	S.D.	$\overline{X}$	S.D.	F	$\overline{X}$	S.D.	$\overline{X}$	S.D.	F
Lying Story #1	2.80	.50	2.76	.66	.06	2.80	.41	2.76	.66	.07	2.80	.41	2.92	.28	1.48
Lying Story #2	2.52	.71	2.12	.93	2.92	1.88	.83	2.12	.93	.93	1.88	.83	2.80	.82	15.56**
Lying Story #3	1.72	.98	1.80	1.00	.08	2.32	.95	1.80	1.00	3.57	2.32	.95	2.52	.87	.60
Justice #3	2.20	.71	2.52	.87	2.03	2.12	.67	2.52	.87	3.32	2.12	.67	2.76	.88	8.42**
Justice #4	2.08	.81	1.76	.97	1.60	2.04	.84	1.76	.97	1.19	2.04	.84	2.60	1.00	4.59*
Clumsiness #1	2.08	1.00	1.56	.92	3.69	2.40	.91	1.56	.92	10.54**	2.40	.91	1.64	.95	8.30**
Clumsiness #2	1.96	1.02	1.56	.92	2.13	2.68	.75	1.56	.92	22.40**	2.68	.75	2.12	1.01	4.94*
Clumsiness #3	2.12	1.01	1.80	1.00	1.26	2.68	.75	1.80	1.00	12.41**	2.68	.75	2.52	1.05	.39
Clumsiness #4	2.64	.64	2.64	.70	.00	2.72	.68	2.64	.70	.17	2.72	.68	2.84	.55	.47
Clumsiness #5	2.08	1.00	1.84	.99	.73	2.72	.67	1.84	.99	13.51**	2.72	.68	2.44	.92	1.51
Collective Responsibility #1	3.36	1.19	3.92	.40	5.00*	3.64	.76	3.92	.40	2.67	3.64	.76	3.88	.60	1.54
Collective Responsibility #2	2.28	.79	1.40	1.00	11.90**	2.40	.91	1.40	1.00	13.64**	2.40	.91	1.96	1.43	1.68
Collective Responsibility #3	3.20	.96	3.36	1.00	.34	3.80	.41	3.36	1.00	4.18*	3.80	.41	2.84	1.43	10.36**
Has Rules	2.52	.51	2.60	.76	.19	2.76	.44	2.60	.76	.83	2.76	.44	2.88	.44	.94
Changes Rules	2.00	.65	1.84	.47	1.00	2.56	.51	1.84	.47	27.00**	2.56	.51	2.04	.79	7.68**

df = 1, 48 *$p < .05$ **$p < .01$

TABLE 22

ANALYSES OF COVARIANCE FOR MORAL JUDGMENT POINT SCALE SCORES WITH MENTAL AGE HELD CONSTANT FOR BLIND AND SIGHTED SUBJECTS

Variable	Source of Variation	MS	F Ratio	Adjusted Means Blind	Adjusted Means Sighted
1. Lie #1	B W	2.09 .24	8.75**	2.66	2.90
2. Lie #2	B W	5.27 .77	6.81*	2.11	2.48
3. Lie #3	B W	6.82 .79	8.67**	1.97	2.40
4. Justice #3	B W	4.07 .69	5.90*	2.19	2.52
5. Justice #4	B W	1.03 .92	1.12	1.84	2.00
6. Clumsiness #1	B W	2.24 .85	2.63	2.22	1.97
7. Clumsiness #2	B W	.22 .76	.29	2.29	2.21
8. Clumsiness #3	B W	2.23 .76	2.92	2.18	2.43
9. Clumsiness #4	B W	1.46 .42	3.48	2.58	2.78
10. Clumsiness #5	B W	.67 .74	.91	2.25	2.39
11. Collective Responsibility #1	B W	3.21 .63	5.09*	3.55	3.84
12. Collective Responsibility #2	B W	.32 1.14	.28	2.29	2.20
13. Collective Responsibility #3	B W	.30 .90	.34	3.42	3.33
14. Has Rules	B W	3.51 .29	11.99**	2.51	2.82
15. Changes Rules	B W	1.08 .42	2.58	2.22	2.05

b = between groups *$p < .05$ **$p < .01$
w = within groups
df = 1, 147

TABLE 23

ANALYSES OF COVARIANCE FOR MORAL JUDGMENT POINT SCALE SCORES WITH CHRONOLOGICAL AGE AND MENTAL AGE HELD CONSTANT FOR BLIND AND SIGHTED SUBJECTS

Variable	Source of Variation	MS	F Ratio	Adjusted Means Blind	Adjusted Means Sighted
1. Lie #1	B	2.10	8.77**	2.66	2.90
	W	.24			
2. Lie #2	B	5.22	6.71*	2.11	2.48
	W	.78			
3. Lie #3	B	7.01	9.04**	1.97	2.40
	W	.77			
4. Justice #3	B	4.13	5.93*	2.19	2.52
	W	.70			
5. Justice #4	B	1.02	1.10	1.84	2.00
	W	.93			
6. Clumsiness #1	B	2.25	2.62	2.22	1.97
	W	.86			
7. Clumsiness #2	B	.20	.27	2.29	2.22
	W	.76			
8. Clumsiness #3	B	2.27	2.96	2.18	2.43
	W	.77			
9. Clumsiness #4	B	1.49	3.52	2.58	2.78
	W	.42			
10. Clumsiness #5	B	.68	.92	2.25	2.39
	W	.74			
11. Collective Responsibility #1	B	3.24	5.12*	3.55	3.84
	W	.63			
12. Collective Responsibility #2	B	.31	.27	2.29	2.20
	W	1.15			
13. Collective Responsibility #3	B	.31	.34	3.42	3.33
	W	.90			
14. Has Rules	B	3.48	11.83**	2.51	2.82
	W	.29			
15. Change	B	1.09	2.57	2.22	2.05
	W	.42			

b - between groups *$\underline{p} < .05$
w - within groups **$\underline{p} < .01$
df - 1, 146

TABLE 24

INTERCORRELATIONS OF POINT SCALE SCORES FOR MORAL JUDGMENT FOR SIGHTED (N=75) AND BLIND (N=75)* SUBJECTS

Variables	Lying Story #1	Lying Story #2	Lying Story #3	Justice #3	Justice #4	Clumsiness #1	Clumsiness #2	Clumsiness #3	Clumsiness #4	Clumsiness #4	Collective Responsibility #1	Collective Responsibility #2	Collective Responsibility #3	Has Rules	Changes Rules
Lying Story #1		.10	.25	.21	.06	.24	.12	.24	.12	.10	.15	.08	-.01	.15	.06
Lying Story #2	.07		.03	.12	.14	-.01	.10	.20	.15	.23	-.01	-.02	.06	.13	.25
Lying Story #3	.16	.11		.09	-.06	.47	.46	.43	.13	.30	.07	.22	.11	.09	.17
Justice #3	-.14	.03	-.07		.36	-.20	-.13	.04	.00	-.10	.11	-.16	-.19	.14	.16
Justice #4	-.03	.21	-.18	.24		-.10	.03	.24	.00	.07	.05	-.20	-.01	.07	.13
Clumsiness #1	.07	.04	.31	-.20	.00		.73	.58	.27	.54	-.06	.28	.21	.04	.10
Clumsiness #2	.04	-.08	.42	-.08	-.12	.59		.74	.19	.66	-.13	.37	.19	.12	.17
Clumsiness #3	.12	.01	.41	-.13	-.06	.59	.68		.18	.64	-.07	.18	.23	.20	.24
Clumsiness #4	.09	.14	.12	-.06	.13	.30	.25	.18		.30	-.03	.04	.05	-.05	.09
Clumsiness #5	.14	.05	.38	-.27	-.01	.64	.57	.64	.38		.01	.21	.17	.20	.23
Collective Responsibility #1	-.18	-.09	-.01	-.05	.09	.19	.27	.20	.14	.28		.02	-.13	.08	.12
Collective Responsibility #2	-.20	.30	.07	.08	.24	.29	.20	.17	.15	.22	.02		-.22	.14	.28
Collective Responsibility #3	.02	-.10	.17	-.07	.12	.19	.07	.13	.21	.35	.26	.09		.03	-.05
Has Rules	.27	-.03	.15	-.01	.14	.17	.29	.35	.10	.32	.18	.27	.20		.31
Changes Rules	.09	-.09	.14	.02	-.05	.11	.27	.25	.19	.24	.03	.21	.30	.49	

* The values above the diagonal represent intercorrelations of data on sighted subjects (N=75); values below the diagonal represent intercorrelations of data on blind subjects (N=75); $p < .05$, $p < .01$ are .23 and .30 respectively.

TABLE 25

ANALYSES OF VARIANCE FOR MORAL CONDUCT ON DICHOTOMOUS SCORES FOR BLIND (N=75) AND SIGHTED (N=75) SUBJECTS

Variables	Blind		Sighted		
	$\bar{X}$	S.D.	$\bar{X}$	S.D.	F
1. Self Control	.85	.36	.89	.31	.54
2. Honesty	.97	.16	.76	.43	16.16**
3. Money Return (1)	.77	.42	.81	.39	.36
4. Money Return (2)	1.00	.00	.81	.39	[a]
5. Mishap	.69	.46	.84	.37	4.59*
6. Cheat (1)	.68	.47	.88	.33	9.16**
7. Cheat (2)	.87	.34	.89	.31	.25
8. Cheat (3)	.87	.34	.95	.23	2.85
9. Cheat (4)	.21	.41	.75	.44	58.96**
10. Cheat (5)	.31	.46	.52	.50	7.29**
11. Hr. Gl. (1)	.73	.45	.92	.27	9.58**
12. Hr. Gl. (2)	.93	.25	.87	.34	1.85
13. Hr. Gl. (3)	.76	.43	.84	.37	1.49
14. Envelope	.96	.20	.89	.31	2.46

[a] On the variable, Money Return (2), blind subjects obtained a perfect score; for this reason, analysis of variance techniques were inappropriate. Therefore, a Mann-Whitney U test was performed. The resultant U = 2325, $p < .01$.

*$p < .05$ **$p < .01$

TABLE 26

PERCENT OF BLIND AND SIGHTED SUBJECTS FAILING ONE OR MORE MORAL CONDUCT TASKS

Age Range	Percentage of Blind	Percentage of Sighted	Percentage of total Sample
6-10	96%	96%	96%
10-14	96%	76%	86%
14-18	96%	64%	80%

TABLE 27

FREQUENCY OF BLIND AND SIGHTED SUBJECTS FAILING MORAL CONDUCT TASKS

Variables	6-10			10-14			14-18			Total For	Total For	Total for Sighted
	Blind	Sighted	Total	Blind	Sighted	Total	Blind	Sighted	Total	Blind	Sighted	and Blind
Self Control	4	5	9	4	3	7	3	1	4	11	9	20
Honesty	2	11	13	0	5	5	0	3	3	2	19	21
Money Return (1)	6	10	16	7	1	8	4	2	6	17	13	30
Money Return (2)	0	9	9	0	3	3	0	1	1	0	13	13
Mishap	9	5	14	7	2	9	7	3	10	23	10	33
Cheat (1)	10	7	17	10	2	12	4	1	5	24	10	34
Cheat (2)	5	0	5	2	4	6	3	3	6	10	7	17
Cheat (3)	4	4	8	4	1	5	2	0	2	10	5	15
Cheat (4)	19	10	29	21	8	29	19	2	21	59	20	79
Cheat (5)	18	16	34	17	14	31	17	5	22	52	35	87
Hr. Glass (1)	7	5	12	5	1	6	8	1	9	20	7	27
Hr. Glass (2)	2	8	10	1	2	3	2	2	4	5	12	17
Hr. Glass (3)	10	7	17	2	3	5	6	3	9	18	13	31
Envelope	1	0	1	2	6	8	0	2	2	3	8	11
Total	88	92	180	75	53	138	68	26	94	231	171	402

TABLE 28

FREQUENCY OF MORAL CONDUCT VIOLATIONS OVER THREE AGE RANGES FOR BLIND AND SIGHTED SUBJECTS

Number of Violations	- Blind -			Total Blind	- Sighted -			Total Sighted
	6-10	10-14	14-18		6-10	10-14	14-18	
0	1	1	1	3	1	6	9	16
1	2	4	5	11	3	3	9	15
2	1	6	4	11	4	4	3	11
3	8	3	7	18	2	7	2	11
4	7	3	3	13	5	3	2	10
5	2	3	2	7	5	1	0	6
6	0	5	2	7	3	1	0	4
7	1	0	1	2	0	0	0	0
8	3	0	0	3	1	0	0	1
9	0	0	0	0	1	0	0	1

TABLE 29

ANALYSES OF VARIANCE FOR MORAL CONDUCT DICHOTOMOUS SCORES
FOR BLIND SUBJECTS CA 6-10; 10-14; 14-18

Variables	6-10 (N=25)		10-14 (N=25)			6-10 (N=25)		14-18 (N=25)			10-14 (N=25)		14-18 (N=25)		
	$\overline{X}$	S.D.	$\overline{X}$	S.D.	F	$\overline{X}$	S.D.	$\overline{X}$	S.D.	F	$\overline{X}$	S.D.	$\overline{X}$	S.D.	F
1. Self-control	.84	.37	.84	.37	.00	.84	.37	.88	.33	.16	.84	.37	.88	.33	.16
2. Honesty	.92	.28	1.00	.00	2.09	.92	.28	1.00	.00	2.09	1.00	.00	1.00	.00	.00
3. Money Return (1)	.76	.44	.72	.46	.10	.76	.44	.84	.37	.48	.72	.46	.84	.37	1.03
4. Money Return (2)	1.00	.00	1.00	.00	.00	1.00	.00	1.00	.00	.00	1.00	.00	1.00	.00	.00
5. Mishap	.64	.49	.72	.46	.36	.64	.49	.72	.46	.36	.72	.46	.72	.46	.00
6. Cheat (1)	.60	.50	.60	.50	.00	.60	.50	.84	.37	3.69	.60	.50	.84	.37	3.69
7. Cheat (2)	.80	.41	.92	.28	1.48	.80	.41	.88	.33	.58	.92	.28	.88	.33	.21
8. Cheat (3)	.84	.37	.84	.37	.00	.84	.37	.92	.28	.74	.84	.37	.92	.28	.74
9. Cheat (4)	.24	.44	.16	.37	.48	.24	.44	.24	.44	.00	.16	.37	.24	.44	.48
10. Cheat (5)	.28	.46	.32	.48	.09	.28	.46	.32	.48	.09	.32	.48	.32	.48	.00
11. Hr. Glass (1)	.72	.46	.80	.41	.42	.72	.46	.68	.48	.09	.80	.41	.68	.48	.92
12. Hr. Glass (2)	.92	.28	.96	.20	.34	.92	.28	.92	.28	.00	.96	.20	.92	.28	.34
13. Hr. Glass (3)	.60	.50	.92	.28	7.84**	.60	.50	.76	.44	1.45	.92	.28	.76	.44	2.40
14. Envelope	.96	.20	.92	.28	.34	.96	.20	1.00	.00	1.00	.92	.28	1.00	.00	2.09

df= 1, 48 * = p < .05 ** = p <.01

TABLE 30

ANALYSES OF VARIANCE FOR MORAL CONDUCT DICHOTOMOUS SCORES FOR SIGHTED SUBJECTS CA 6-10; 10-14; 14-18

Variables	6-10		10-14			6-10		14-18			10-14		14-18		
	(N=25)		(N=25)			(N=25)		(N=25)			(N=25)		(N=25)		
	$\bar{X}$	S.D.	$\bar{X}$	S.D.	F	$\bar{X}$	S.D.	$\bar{X}$	S.D.	F	$\bar{X}$	S.D.	$\bar{X}$	S.D.	F
1. Self Control	.84	.37	.88	.33	.16	.84	.37	.96	.20	2.00	.88	.33	.96	.20	1.07
2. Honesty	.60	.50	.80	.41	2.40	.60	.50	.88	.33	5.44*	.80	.41	.88	.33	.58
3. Money Return (1)	.56	.51	.96	.20	13.48**	.56	.51	.92	.28	9.72**	.96	.20	.92	.28	.34
4. Money Return (2)	.60	.50	.88	.33	5.44*	.60	.50	.96	.20	11.17**	.88	.33	.96	.20	1.07
5. Mishap	.72	.46	.92	.28	3.49	.72	.46	.88	.33	2.00	.92	.28	.88	.33	.21
6. Cheat (1)	.76	.44	.92	.28	2.40	.76	.44	.96	.20	4.35*	.92	.28	.96	.20	.34
7. Cheat (2)	.96	.20	.84	.37	2.00	.96	.20	.88	.33	1.07	.84	.37	.88	.33	.16
8. Cheat (3)	.88	.33	.96	.20	1.07	.88	.33	1.00	.00	3.27	.96	.20	1.00	.00	1.00
9. Cheat (4)	.64	.49	.68	.48	.09	.64	.49	.92	.28	6.19**	.68	.48	.92	.28	4.75*
10. Cheat (5)	.32	.48	.44	.51	.74	.32	.48	.80	.41	14.64**	.44	.51	.80	.41	7.65**
11. Hr. Glass (1)	.84	.37	.96	.20	2.00	.84	.37	.96	.20	2.00	.96	.20	.96	.20	.00
12. Hr. Glass (2)	.76	.44	.92	.28	2.40	.76	.44	.92	.28	2.40	.92	.28	.92	.28	.00
13. Hr. Glass (3)	.76	.44	.88	.33	1.20	.76	.44	.88	.33	1.20	.88	.33	.88	.33	.00
14. Envelope	1.00	.00	.76	.44	[a]	1.00	.00	.92	.28	[b]	.76	.44	.92	.28	2.40

[a] Because the sighted 6-10 age group obtained perfect scores on Envelope, the analysis of variance technique was inappropriate. Therefore, a Mann-Whitney U test was used to test the significance of the difference between groups. A U of 238 was obtained, $p < .01$

[b] Because analysis of variance techniques were inappropriate, a Mann-Whitney U test was used. The obtained U=288, NS.

df = 2, 48 $* = p < .05$ $** = p < .01$

TABLE 31

FREQUENCY OF FAILURES ON MORAL CONDUCT TASKS FOR BLIND AND SIGHTED (75 BLIND AND 75 SIGHTED) SUBJECTS

Variable	Blind	Sighted	Total	Chi x^2
Self Control	11	9	20	.06
Honesty	2	19	21	14.17**
Money Return (1)	17	13	30	.38
Money Return (2)	0	13	13	12.13**
Mishap	23	10	33	5.59**
Cheat (1)	24	10	34	6.43**
Cheat (2)	10	7	17	.27
Cheat (3)	10	5	15	1.19
Cheat (4)	59	20	79	38.62**
Cheat (5)	52	35	87	7.01**
Hr. Glass (1)	20	7	27	6.50**
Hr. Glass (2)	5	12	17	2.39
Hr. Glass (3)	18	13	31	.65
Envelope	3	8	11	1.57
Total	254	181	435	

** = $p < .01$

TABLE 32

ANALYSES OF VARIANCE FOR MORAL CONDUCT DICHOTOMOUS SCORES FOR BLIND AND SIGHTED SUBJECTS OF THREE AGE GROUPS

Variables	Ages 6-10 N=25					Ages 10-14 N=25					Ages 14-18 N=25				
	Blind		Sighted			Blind		Sighted			Blind		Sighted		
	$\bar{X}$	S.D.	$\bar{X}$	S.D.	F	$\bar{X}$	S.D	$\bar{X}$	S.D.	F	$\bar{X}$	S.D	$\bar{X}$	S.D	F
1. Self Control	.84	.37	.84	.37	.00	.84	.37	.88	.33	.16	.88	.33	.96	.20	1.07
2. Honesty	.92	.28	.60	.50	7.84**	1.00	.00	.80	.41	b	1.00	.00	.88	.33	d
3. Money Return (1)	.76	.44	.56	.51	2.24	.72	.46	.96	.20	5.76**	.84	.37	.92	.28	.74
4. Money Return (2)	1.00	.00	.60	.50	a	1.00	.00	.88	.33	c	1.00	.00	.96	.20	e
5. Mishap	.64	.49	.72	.46	.36	.72	.46	.92	.28	3.49	.72	.46	.88	.33	2.00
6. Cheat (1)	.60	.50	.76	.44	1.45	.60	.50	.92	.28	7.84**	.84	.37	.96	.20	2.00
7. Cheat (2)	.80	.41	.96	.20	3.10	.92	.28	.84	.37	.75	.88	.33	.88	.33	.00
8. Cheat (3)	.84	.37	.88	.33	.16	.84	.37	.96	.20	2.00	.92	.28	1.00	.00	2.09
9. Cheat (4)	.24	.44	.64	.49	9.32**	.16	.37	.68	.48	18.44**	.24	.44	.92	.28	43.35**
10. Cheat (5)	.28	.46	.32	.48	.09	.32	.48	.44	.51	.74	.32	.48	.80	.41	14.64**
11. Hr. Glass (1)	.72	.46	.84	.37	1.03	.80	.41	.96	.20	3.10	.68	.48	.96	.20	7.35**
12. Hr. Glass (2)	.92	.28	.76	.44	2.40	.96	.20	.92	.28	.34	.92	.28	.92	.28	.00
13. Hr. Glass (3)	.60	.50	.76	.44	1.45	.92	.28	.88	.33	.21	.76	.44	.88	.33	1.20
14. Envelope	.96	.20	1.00	.00	1.00	.92	.28	.76	.44	2.40	1.00	.00	.92	.28	f

df = 1, 48 $\quad ^{*}\underline{p} < .05 \quad ^{**}\underline{p} < .01$ Because analysis of variance techniques were inappropriate for the following comparisons, a Mann-Whitney U test was performed for each.

[a] U = 213, $\underline{p} < .01$
[b] U = 250, $\underline{p} < .05$
[c] U = 275, NS
[d] U = 275, NS
[e] U = 300, NS
[f] U = 288, NS

TABLE 33

ANALYSES OF VARIANCE FOR MORAL CONDUCT DICHOTOMOUS SCORES
FOR BLIND AND SIGHTED SUBJECTS OF VARIOUS AGE GROUPS

Variables	N=25					N=25					N=25				
	10-14 Blind		6-10 Sight[illegible]			14-18 Blind		6-10 Sighted			14-18 Blind		10-14 Sighted		
	$\bar{X}$	S.D.	$\bar{X}$	[illegible]D.	F	$\bar{X}$	S.D	$\bar{X}$	S.D.	F	$\bar{X}$	S.D.	$\bar{X}$	S.D.	F
1. Self Control	.84	.37	.84	.37	.00	.88	.33	.84	.37	.16	.88	.33	.88	.33	.00
2. Honesty	1.00	.00	.60	.50	a	1.00	.00	.60	.50	c	1.00	.00	.80	.41	e
3. Money Return(1)	.72	.46	.56	.51	1.37	.84	.37	.56	.51	4.94*	.84	.37	.96	.20	2.00
4. Money Return(2)	1.00	.00	.60	.50	b	1.00	.00	.60	.50	d	1.00	.00	.88	.33	f
5. Mishap	.72	.46	.72	.46	.00	.72	.46	.72	.46	.00	.72	.46	.92	.28	3.49
6. Cheat (1)	.60	.50	.76	.44	1.45	.84	.37	.76	.44	.48	.84	.37	.92	.28	.74
7. Cheat (2)	.92	.28	.96	.20	.34	.88	.33	.96	.20	1.07	.88	.33	.84	.37	.16
8. Cheat (3)	.84	.37	.88	.33	.16	.92	.28	.88	.33	.21	.92	.28	.96	.20	.34
9. Cheat (4)	.16	.37	.64	.49	15.16**	.24	.44	.64	.49	9.30**	.24	.44	.68	.48	11.62**
10. Cheat (5)	.32	.48	.32	.48	.00	.32	.48	.32	.48	.00	.32	.48	.44	.51	.74
11. Hour Gl. (1)	.80	.41	.84	.37	.13	.68	.48	.84	.37	1.75	.68	.48	.96	.20	7.35**
12. Hour Gl. (2)	.96	.20	.76	.44	4.35*	.92	.28	.76	.44	2.40	.92	.28	.92	.28	.00
13. Hour Gl. (3)	.92	.28	.76	.44	2.40	.76	.44	.76	.44	.00	.76	.44	.88	.33	1.20
14. Envelope	.92	.28	1.00	.00	2.69	1.00	.00	1.00	.00	.00	1.00	.00	.76	.44	g

df = 1, 48   * = $p < .05$ ** = $p < .01$

Because analysis of variance techniques were inappropriate for the following comparisons, a Mann-Whitney U test was performed for each.

[a] U = 175, $p < .01$
[b] U = 200, $p < .01$
[c] U = 175, $p < .01$
[d] U = 200, $p < .01$
[e] U = 263, NS
[f] U = 288, NS
[g] U = 250, NS

TABLE 34

ANALYSES OF COVARIANCE FOR MORAL CONDUCT POINT SCALE SCORES WITH MENTAL AGE HELD CONSTANT FOR BLIND AND SIGHTED SUBJECTS

Variable	Source of Variation	MS	F Ratio	Adjusted Means Blind	Adjusted Means Sighted
1. Self Control	B. Grps	.07	.61	.85	.89
	W. Grps	.11			
2. Honesty	B. Grps	1.62	16.19**	.97	.76
	W. Grps	.10			
3. Money Return (1)	B. Grps	.82	.52	.77	.82
	W. Grps	.16			
4. Money Return (2)	B. Grps	1.22	17.46**	1.00	.82
	W. Grps	.07			
5. Mishap	B. Grps	.86	4.96*	.69	.84
	W. Grps	.17			
6. Cheat (1)	B. Grps	1.60	10.24**	.68	.88
	W. Grps	.16			
7. Cheat (2)	B. Grps	.03	.25	.87	.89
	W. Grps	.18			
8. Cheat (3)	B. Grps	.26	3.22	.87	.95
	W. Grps	.08			
9. Cheat (4)	B. Grps	10.84	60.93**	.21	.75
	W. Grps	.18			
10. Cheat (5)	B. Grps	1.80	7.91**	.30	.52
	W. Grps	.23			
11. Hr. Glass (1)	B. Grps	1.32	9.67**	.73	.92
	W. Grps	.14			
12. Hr. Glass (2)	B. Grps	.16	1.75	.93	.87
	W. Grps	.09			
13. Hr. Glass (3)	B. Grps	.26	1.67	.76	.84
	W. Grps	.16			
14. Envelope	B. Grps	.17	2.44	.96	.89
	W. Grps	.07			

df = 1, 147
* $p < .05$
** $p < .01$

B = Between groups
W = Within groups

TABLE 35

ANALYSES OF COVARIANCE FOR POINT SCALE SCORES WITH MENTAL AGE AND CHRONOLOGICAL AGE HELD CONSTANT FOR BLIND AND SIGHTED SUBJECTS

Variables	Source of	MS	F	Adjusted	Means
	Variation		Ratio	Blind	Sighted
1. Self Control	B. Grps	.10	.91	.85	.90
	W. Grps	.11			
2. Honesty	B. Grps	1.59	15.81**	.97	.76
	W. Grps	.10			
3. Money (1)	B. Grps	.08	.52	.77	.82
	W. Grps	.16			
4. Money (2)	B. Grps	1.20	17.02**	1.00	.82
	W. Grps	.07			
5. Mishap	B. Grps	.92	5.30*	.69	.85
	W. Grps	.17			
6. Cheat (1)	B. Grps	1.65	10.56**	.67	.89
	W. Grps	.16			
7. Cheat (2)	B. Grps	.02	.20	.87	.89
	W. Grps	.11			
8. Cheat (3)	B. Grps	.28	3.35	.86	.95
	W. Grps	.08			
9. Cheat (4)	B. Grps	10.73	59.92**	.21	.75
	W. Grps	.18			
10. Cheat (5)	B. Grps	1.61	7.11**	.31	.52
	W. Grps	.23			
11. Hr. Gl. (1)	B. Grps	1.31	9.48**	.73	.92
	W. Grps	.14			
12. Hr. Gl. (2)	B. Grps	.14	1.59	.93	.87
	W. Grps	.09			
13. Hr. Gl. (3)	B. Grps	.25	1.58	.76	.84
	W. Grps	.16			
14. Envelope	B. Grps	.15	2.17	.96	.90
	W. Grps	.07			

df = 1, 147
*p < .05
**p < .01

B = Between groups
W = Within groups

TABLE 36

INTERCORRELATIONS OF MORAL CONDUCT MEASURES FOR SIGHTED (N=75) AND BLIND (N=75)* SUBJECTS

Variables	Self Control	Honesty	Money (1)	Money (2)	Mishap	Cheat (1)	Cheat (2)	Cheat (3)	Cheat (4)	Cheat (5)	Hr. Gl. (1)	Hr. Gl. (2)	Hr. Gl. (3)	Envelope
Self Control		.11	.17	.17	.08	.27	-.12	-.08	.10	.10	.22	-.01	.08	-.12
Honesty	-.07		.37	.37	-.16	-.02	-.09	.01	.32	.15	-.05	.06	-.16	-.19
Money (1)	.23	.31		.39	-.02	.14	-.17	.19	.27	.16	.11	.21	-.02	-.17
Money (2)	I	I	I		.16	.03	.06	.19	.35	.22	.11	.32	.16	-.05
Mishap	.05	.07	.12	I		.06	-.03	-.10	.00	.02	-.13	.04	.31	-.15
Cheat (1)	.12	.24	.11	I	-.02		.01	.10	-.12	.14	.04	-.02	.17	.01
Cheat (2)	.06	.18	.16	I	-.01	.07		.11	.20	.19	-.10	.12	-.03	.16
Cheat (3)	.06	.18	.26	I	-.09	.32	.08		.00	.01	.37	.08	.22	.11
Cheat (4)	.03	-.12	-.03	I	-.29	.29	.11	.11		.36	-.06	.04	-.09	.00
Cheat (5)	-.05	-.07	.08	I	-.31	.39	.09	.26	.57		-.09	.02	-.13	.10
Hr. Gl. (1)	.18	.09	.11	I	.19	.30	.12	.21	.17	.01		.46	.54	.06
Hr. Gl. (2)	.19	-.04	-.02	I	-.06	.05	.21	.21	.01	-.05	.20		.47	-.01
Hr. Gl. (3)	.21	.10	.07	I	-.04	.28	-.04	.06	.14	.04	.44	.10		.08
Envelope	-.08	-.03	-.11	I	.01	-.14	.12	-.08	-.23	-.01	-.12	-.03	-.11	

* The values above the diagonal represent intercorrelations of data on sighted subjects (N=75); values below the diagonal represent intercorrelations of data on blind subjects (N=75); p <.05, p <.01 are .23 and .30 respectively.

I = Identity

TABLE 37

FACTOR STRUCTURE OF POINT SCALE SCORES FOR BLIND SUBJECTS ON 38 REASONING AND PSYCHO-EDUCATIONAL MEASURES

Variable	Loading	Eigenvalue
Factor 1		
Major loadings from seven conservation assessments combine to represent Piagetian "reversability" of thought at the concrete and formal level.		
Conservation of Substance	.81	8.38
Sugar Substance	.63	
Conservation of Weight	.77	
Conservation of Volume (1-3)	.50	
Conservation of Length	.61	
Rod Sections	.72	
Conservation of Liquid	.66	
Factor 2		
Negative loadings from WISC and WRAT (adapted for use with the blind) subscores combine with positive loadings from CA, MA, and a Piagetian classificatory task.		
Wechsler Information	-.53	3.65
Wechsler Arithmetic	-.67	
Wrat Arithmetic	-.75	
CA	.69	
MA	.60	
Class Inclusion Beads	.38	
Factor 3		
Subscores on the WRAT combine to suggest language arts ability		
WRAT Spelling	.85	2.12
WRAT Reading	.82	
Factor 4		
Combinatory logic is defined by a Wechsler and a Piagetian measure.		
Wechsler Similarities	.68	1.72
Chemistry	.64	

TABLE 37 Continued

Variable	Loading	Eigenvalue
Factor 5		
Basic or initial ability in concrete reasoning is defined by tasks involving numerical correspondence, hierarchical classification, subcategorization, and memory and mental imagery.		
One-for-One Exchange	.51	1.58
Term-to-Term Correspondence	.39	
Animal (3)	.52	
Rotation of Beads	.53	
Changing Criterion	.62	
Class Intersection	.58	
Changing Perspectives (stationary)	.53	
Factor 6		
Ability to dissociate notions of weight and volume and engage in formal or abstract thought is represented by the factor.		
Conservation of Volume (4)	.72	1.47
Weight and Volume	.61	
Factor 7		
Understanding of spatial relationships, hierarchical classification ability, and Wechsler measured comprehension define a factor suggestive of analytical reasoning.		
Wechsler Comprehension	.42	1.29
Animal (4)	.54	
Animal (5a)	.37	
Animal (5b)	.51	
Rotation of Squares	.43	
Change from 2 to 3 dimension	.56	
Factor 8		
Major loadings are contributed by scores on measures requiring thought which is transitory between concrete and formal or abstract.		
Sugar Weight	.79	1.22
Sugar Volume	.72	

TABLE 37 Continued

Variable	Loading	Eigenvalue
Factor 9		
Scores which tapped the recall of digits and the ability to engage in mental imagery which involved changing perspectives combined to indicate skill in grouping objects and numbers in situations involving short term memory.		
Wechsler Digit Span	.73	1.12
Changing Perspective Mobile	.47	
Factor 10		
Verbal facility was indicated by loadings from Wechsler measures of verbal ability.		
Wechsler Vocabulary	.84	1.03
Wechsler Verbal IQ	.64	

TABLE 38

FACTOR STRUCTURE OF POINT SCALE SCORES FOR SIGHTED SUBJECTS ON 38 REASONING AND PSYCHO-EDUCATIONAL MEASURES

Factor 1

Reversability, the ability basic to conservation tasks, is represented by major loadings from the conservation tasks. Loadings from two classificatory tasks serve to denote the relationship between flexibility and reversability of thought.

Variable	Loading	Eigenvalue
CA	.44	11.29
Conservation of Substance	.86	
One-to-One	.60	
Sugar Weight	.38	
Sugar Substance	.63	
Conservation of Weight	.84	
Term-to-Term	.67	
Conservation of Volume (1-3)	.52	
Conservation of Length	.63	
Rod Sections	.86	
Changing Criteria	.60	
Conservation of Liquids	.77	
Class Inclusion	.47	
Rotation of Squares	.37	

Factor 2

Academic achievement is indicated by loadings from the three WRAT subtests and from Wechsler Arithmetic.

Variable	Loading	Eigenvalue
Wechsler Arithmetic	-.59	3.38
WRAT Spelling	-.74	
WRAT Arithmetic	-.69	
WRAT Reading	-.73	

Factor 3

A Wechsler Verbal factor had loadings from Wechsler Comprehension, Verbal IQ and MA.

Variable	Loading	Eigenvalue
Wechsler Comprehension	.77	2.22
Wechsler Verbal IQ	.63	
MA	.50	

TABLE 38 Continued

Variable	Loadings	Eigenvalue
Factor 4		
The factor, which was defined by Piagetian measures of hierarchical classification and combinatory logic and Wechsler similarities, was representative of advanced logical reasoning.		
Similarities	.67	2.17
Animal (3)	.70	
Animal (4)	.75	
Animal (5a)	.43	
Animal (5b)	.63	
Chemistry	.41	
Factor 5		
Four measures of formal thought combined with a task involving simultaneous classification on two criteria to define the factor.		
Conservation of Volume (1-3)	.52	1.49
Conservation of Volume (4)	.81	
Weight and Volume	.75	
Intersection of Classes	.44	
2-3D	.40	
Factor 6		
A verbal factor was defined by loadings from Wechsler verbal subtests, Information and Vocabulary.		
Wechsler Information	.79	1.35
Wechsler Vocabulary	.61	
Factor 7		
A Wechsler measure of short term memory and a Piagetian measure of perceptual mobility combined to define the factor.		
Wechsler Digit Span	.72	1.28
Changing Perspectives - Mobile	.43	

TABLE 38 Continued

Variable	Loadings	Eigenvalue
Factor 8		
The factor was defined by three Piagetian measures of spatial relations and one Piagetian measure of formal reasoning.		
Sugar Volume	.56	1.05
Rotation of Beads	.59	
Square Rotation	.36	
Changing Perspectives - Stationary	.44	
CA	.44	

TABLE 39

CONGRUENCE MATRIX FOR FACTOR MATRICES OBTAINED FROM SIGHTED SUBJECTS' (N=75) AND FROM BLIND SUBJECTS' (N=75) SCORES ON REASONING ASSESSMENTS AND PSYCHO-EDUCATIONAL MEASURES

FACTORS FOR BLIND	FACTORS FOR SIGHTED							
	1	2	3	4	5	6	7	8
1	.90	.06	.29	.42	.47	.17	.34	.42
2	.37	.64	.10	.34	.12	-.31	.09	.42
3	.03	-.76	.12	.07	-.03	.38	.14	.06
4	.11	-.02	.06	.32	.06	.06	-.06	-.05
5	.73	-.03	.12	.51	.43	.08	.39	.53
6	.29	.10	-.04	.32	.60	.05	.18	.16
7	.58	.10	.51	.60	.50	.11	.49	.44
8	.16	.34	.05	.08	.34	.21	-.04	.36
9	.24	-.18	.26	.21	.07	.15	.66	.05
10	.07	-.37	.37	.16	.14	.64	.06	-.13

TABLE A

INTER-RATER RELIABILITY FOR POINT SCALE SCORES FOR REASONING VARIABLES

Variables	Rater 1 Rater 2
Con. Sub. (1)	1.00
Con. Sub. (2)	1.00
Con. Sub. (3)	1.00
1 to 1 (1)	.98
1 to 1 (2)	.98
Sugar (1)	.99
Sugar (2)	.99
Sugar (3)	.99
Sugar (4)	1.00
Sugar (5)	1.00
Con. Wt. (1)	1.00
Con. Wt. (2)	1.00
Con. Wt. (3)	1.00
Term to Term (1)	1.00
Term to Term (2)	.99
Term to Term (3)	.95
Term to Term (4)	1.00
Animal (3a)	1.00
Animal (3b)	1.00
Animal (3c)	1.00
Animal (3d)	.95
Animal (4a)	1.00
Animal (4b)	1.00
Animal (4c)	1.00
Animal (4d)	.94
Animal (4e)	.99
Animal (4f)	1.00
Animal (5a)	1.00
Animal (5a^1)	.99
Animal (5b)	.99
Con. Vol. (1)	1.00
Con. Vol. (2)	.93
Con. Vol. (3)	1.00
Con. Vol. (4)	1.00
Con. Vol. (5)	1.00
Con. Vol. (6)	1.00
Con. Vol. (7)	1.00
Con. Length (1)	.99
Con. Length (2)	1.00
Con. Length (3)	1.00
Rod Sections (1)	1.00
Rod Sections (2)	1.00
Rod Sections (3)	1.00

TABLE A (continued)

Variables	Rater 1 Rater 2
Con. Liquid (1)	.98
Con. Liquid (2)	1.00
Con. Liquid (3)	1.00
Wt. & Vol. (1)	1.00
Wt. & Vol. (2)	1.00
Wt. & Vol. (3)	1.00
Wt. & Vol. (4)	1.00
Wt. & Vol. (5)	1.00
Wt. & Vol. (6)	1.00
Wt. & Vol. (7)	1.00
Wt. & Vol. (8)	1.00
Chemistry	1.00
Coordination of Perspectives Presentation	.96
Position (1)	1.00
Position (7)	1.00
Position (6)	1.00
Position (5)	1.00
Position (0)	.99
Position (4)	1.00
Position (3)	1.00
Position (8)	1.00
Picture (4)	.98
Picture (5)	1.00
Picture (3)	1.00
Picture (6)	.99
Picture (2)	.99
Picture (7)	1.00
Picture (1)	1.00
Picture (8)	1.00
2-3 dimension (1)	1.00
2-3 dimension (2)	.92
2-3 dimension (3)	1.00
2-3 dimension (4)	1.00
Intersection of Classes	
1-5	.94
7-2	1.00
3-6	1.00
4-5	.94
6-2	1.00
1-7	1.00
4-7	1.00
3-5	1.00

TABLE B

GENERAL CONVERSION TABLE FOR STATUS INDICES

Index Score	Relative Status Level	Social Class Prediction	Break Points and Intervals of Indeterminancy	Life Style[A]	Intervals Employed in Correlation
12	A+	(UC)			
13-17	A	Upper Class	12--22	Superordinate	16 plus
18-22	A-				17-21
			(23--24)		
23-27	B+	(UM)			22-26
28-32	B	Upper-Middle	25--33	Dominant UM	27-31
33-37	B-				32-36
			(34--37)		
38-41	C+	(LM)			37-41
42-46	C	Lower-Middle	38--50	Dominant LM	42-46
47-51	C-				47-51
			(51--53)		
52-56	D+	(UL)			52-56
57-61	D	Upper-Lower	54--62	Alternate	57-61
62-66	D-				62-66
			(63--66)		
67-71	E+	(LL)			67-71
72-75	E	Lower-Lower	67--84	Deviant	72-76
76-84	E-				77 Minus

[A] Insufficient research has been done in life styles or in class-typed value orientations to give precise break points for conversion of total index scores to classificatory terms. . . . The intervals of indeterminancy, shown in parentheses, often represent the index scores of persons who are changing status or shifting from one life style to another (mobility).

Note. From "The Measurement of Social Status" by C. McGuire and G. D. White, Research Paper in Human Development, Number 3. Laboratory of Human Behavior, Austin, Texas: The University of Texas, 1955.